THE IRON AGE

New York, June 7, 1917

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A Notable Small-Tonnage Foundry

The Construction and Operating Methods of the New Foundry of the Universal Winding Company, Cranston, R. I.

ANOTHER has been added to the list of noteworthy New England foundries by the opening of the new foundry of the Universal Winding Company, Cranston, R. I., a suburb of Providence. While some comparatively heavy frame castings will be poured, the bulk of the work will be in the form of small and light castings of the somewhat intricate shape. These are required by the design of the machines produced by this highly specialized industry, which has a high reputation and a world-wide trade in the textile field. The plan of this foundry is the result of a thorough examination of the better-equipped foundries of New England and the Middle West by William A. Booth, general superintendent, and W. H. Harriman, construction engineer. For many of the details of equipment, Charles F. Miller, foundry superintendent, is responsible.

The main foundry building, of the monitor type, is 159 x 180 ft., with a two-story front section 42 x 159 ft. Its external appearance is here well shown. The main floor under the monitor is 93 x 180 ft. The columns supporting the roof are 20 ft. apart in a longitudinal direction and 24½ ft. from the edges of the monitor, leaving a clear space of 44 ft. in the middle of the molding floor. This makes it possible to have molding floors 10 x 20 ft. in size with a 4-ft. gangway down the middle. The spaces on each side of the monitor under the main roof are each 33 x 180 ft.

The cupola is located in a bay 20 x 33 ft., at the northwest corner of the building. This section is carried up to provide for a mezzanine and a charging floor. It is located at the rear of the building so that when it becomes necessary to extend the building, the cupolas will then be in the

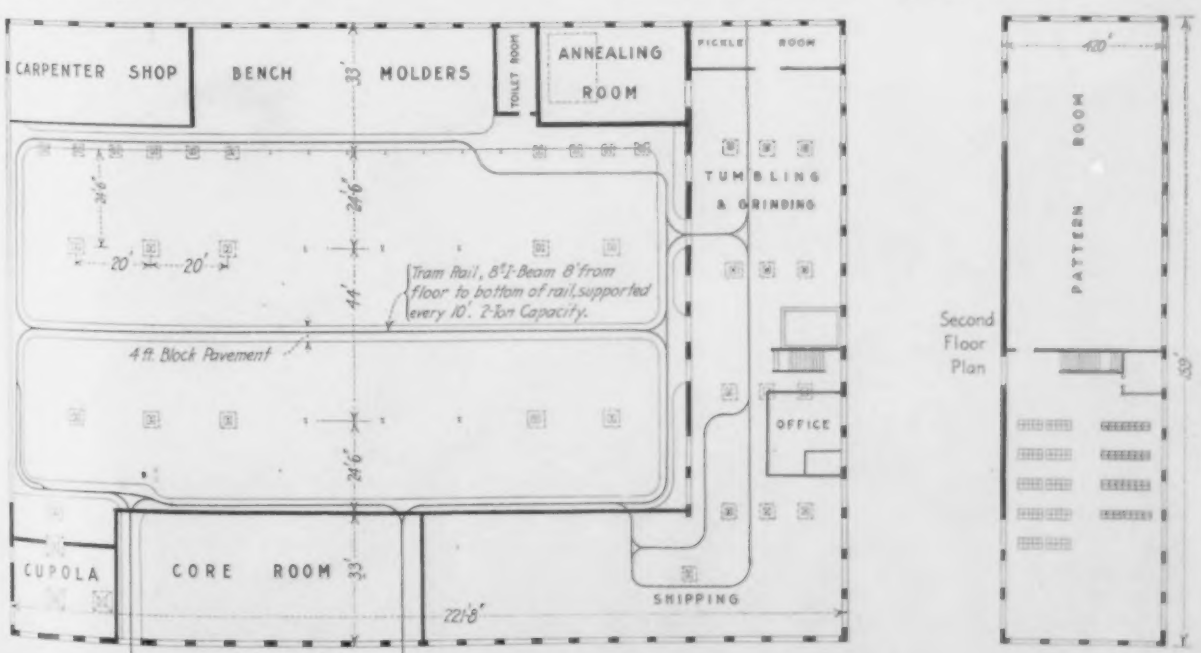


Fig. 1—A Considerable Use of Overhead Tramways is a Feature of the Universal Winding Company's Foundry

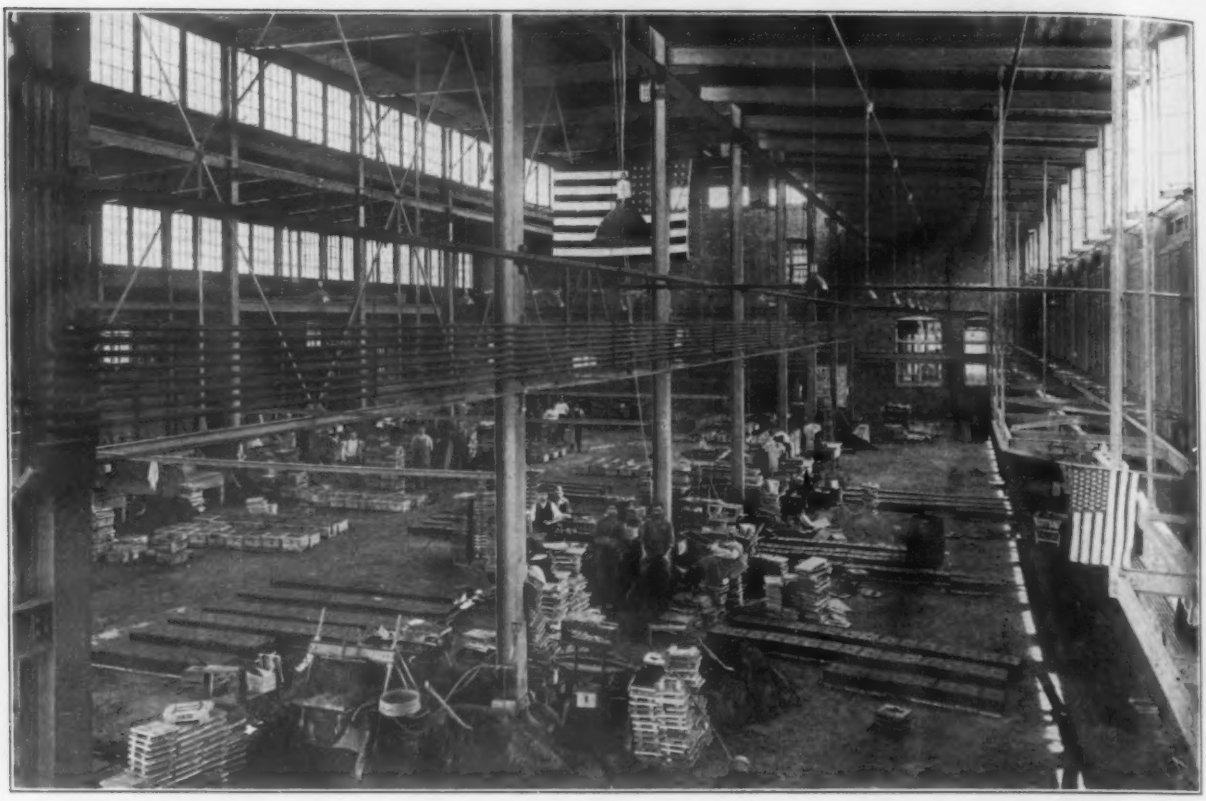


Fig. 2—The Lighting Afforded by This Type of Monitor Construction Is Such that It Is Found Almost Impossible to Cast a Shadow on the Molding Floor. The windows in the monitor are pivoted top and bottom and are mechanically operated from the floor. Equipment in process of installation

center of the structure. The cupola now installed is a Paxson, Calleau type, with 76 in. shell. With single lining this is rated to melt 13 tons per hour, but is now lined to 48 in. with a melting capacity of 9 tons an hour. The bottom is held up by a collapsible cupola leg so arranged with an eccentric joint that pulling on a rope lifts a latch which collapses the leg. The bottom is pulled out by a winch-operated rack. A Hauck crude oil burner is used to light the cupola and this also has a nozzle for drying ladles. Space has been left for another cupola.

The blast for the cupola is furnished by a No. 6A Wilbraham Green positive pressure blower, driven by a 35-hp. direct-connected motor. This apparatus and the switchboard for controlling the electric current for lights and power are located on the mezzanine floor surrounding the cupola shell at about half its height. Above this is the charging floor, 34 x 40 ft. The surface of this floor is protected by checkered steel plates, ⅜ in. thick. Materials are brought to this floor by an elevator, but provision has been made for emergency hoisting by an electric hoist supported by a beam extending from the wall on the outside of the building. A 2-ton Kron scale is used for weighing the charges. Steel pig-iron barrows and steel coke wagons of Sterling make are used for transporting materials. The mezzanine and charging floors are also reached by an iron stairway.

The molding floor, with its central bay 44 ft. wide and its side bays 24 ft. wide, will accommodate 65 molders. But little hand molding will be done, molding machines being used almost exclusively.

Fig. 3—Steel Pig-Iron Barrows and Steel Coke Wagons Are in Use and a Kron Scale Is Located in Front of the Elevator so that Loads Are Weighed on the Way to the Cupola. The charging floor is protected by ⅜-in. checkered steel plates

Fig. 4—The Blower and Switchboard Are on the Mezzanine Floor with the Charging Floor Above. The monorail system provides for conveying ladles and dumping buckets. Materials are carried to the charging floor by an elevator or by an emergeucy electric hoist outside the building

Small pieces will be made on squeezers and large pieces on stripping plates and jolt ram roll-over machines. The larger molding machines will all be located in the east bay which is equipped with a 2-ton traveling crane to facilitate handling the heavy work. The smaller molding machines are placed in groups of four about each column. By this placing the sand piles will come in alignment across the molding floor so that a sand cutter can be operated most advantageously. A Combs gyratory riddle is employed to prepare sand for the heavy molding machines, for facings and for cores.

One of the features of this foundry is a tramrail of 2-ton capacity, composed of 8-in. I-beams, supported at a height of 8 ft. from the floor by rods at 10-foot intervals. The lay-out of this tramrail and the position of switches and sidings is plainly shown on the ground plan, Fig. 1. The utility of this and the comparative size of the ladles in general use are to be seen in the illustration of the cupola. Biehl dumping buckets are used to carry castings to the cleaning and shipping rooms and for conveying sprues and gates from the floor to the cupola section. The tramrail extends into the core room and to the sand bins.

The molding floor is composed of 4 in. of loam, taken from the foundry site, on which is placed 3 in. of molding sand. Floors, other than the molding floor, are of concrete.

The core room, 33 x 80 ft., is on the west side of the building, adjoining the cupola. The core ovens, Fig. 5, are a battery of the 5-draw type made by the Coleman Foundry Equipment Company. Benches placed transversely to the length of the

Fig. 5—The Equipment of Coleman Core Ovens. Provision is made for 35 coremakers. Each man is provided with one of the sturdy tables shown in front of the bench so that molded cores will not be disturbed by the ramming of cores

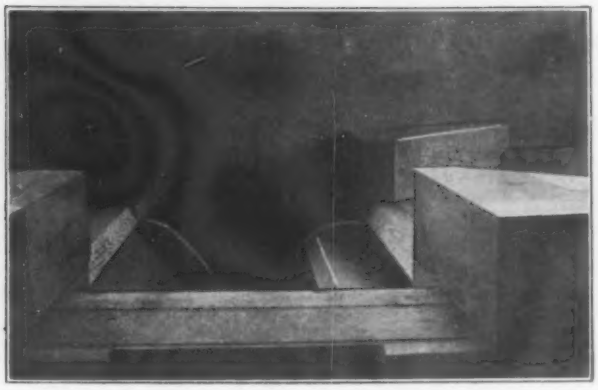


Fig. 6—The Deflector at the End of the Pickle Bed on the Right Is Set to Return the Acid to the Storage Tank. The pickle beds are flush with the floor

room provide space for 35 core makers. Each man is furnished with a substantial table for molded cores, so that his finished product will not be disturbed by the ramming of work on the bench. Wadsworth steel core plates are in use and racks made of iron pipes are installed to hold cores while cooling. A deposit of good core sand, sufficient to last for a long time, was found on the building site. A large number of small circular cores are needed for the usual work of the foundry and these are made on end, 200 to 300 at a time in a box, on a jarring machine.

The annealing room and the carpenter shop take up much of the space on the east side of the building. The annealing room opens directly from the cleaning room and is equipped with two No. 4 Brown & Sharpe furnaces. Between the carpenter shop at the rear of this section of the structure and the annealing room is a space given over to bench molders and to a toilet room. The carpenter shop is 26 x 50 ft. and is equipped with a Crescent No. 3 universal saw table, an 18-in. buzz planer and a 36-in. band saw.

The office, cleaning, shipping and pattern rooms, and the toilet and locker rooms, are located in the two-story front section. The cleaning room occupies the east side of the ground floor, measuring 40 x 85 ft. Besides the usual equipment of floor stands for cleaning, there is installed a Pangborn type L sand-blast room for cleaning floor castings. Bench castings are cleaned in a Pangborn type GB barrel. Plans have been made also for the installation of a sand-blast revolving table.

One end of the cleaning room is divided off into a pickle room which has two sloping pickle beds discharging into a central duct. A special feature of this installation is the deflectors, Fig. 6, which can be adjusted so that the acid can be drained off to storage vats and the water into a settling tank and thence to a sewer. The dip tanks are set into the floor directly beside the pickle beds. The pickle beds are flush with the floor and are lead covered.

The office and shipping room occupy the remainder of the ground floor. Shipments are weighed out on a 2500-lb. Kron scale which has its platform in the shipping room and its dial in the office. This scale also has a computing attachment for ascertaining the number of pieces in any lot of small castings being weighed. A concrete runway leads from the foundry to the main plant and castings are conveyed by electric mill trucks.

The room over the cleaning room is used for

PAT. No. 160-34 Order No. 7070
WANTED July 10
Pattern Name Intermediate Bearing
No. Ordered 300 Wt. per Piece 3lb. 4oz.
No. Daily 25
Ordered By Supply Dept. For Stock
Send Castings to Receiving room
Molder H. Pryer
Cast Iron Stock Room.

PAT. No. 160-34 Order No. 7070
WANTED July 10
Pattern Name Intermediate Bearing
No. Ordered 300
No. Daily 25
Ordered By Supply Dept. For Stock
Molder H. Pryer
No. Pats. in Flask 4-12x12 Filling Pieces —
Price per Flask .13 Finished July 6
(7)
Foundry.

Molder's Tag.
PAT. No. 160-34 Order No. 7070
WANTED July 10
Pattern Name Intermediate Bearing
No. Ordered 300 No. Daily 25
Ordered By Supply Dept. For Stock
Molder H. Pryer Filling Pieces —
No. Pats. in Flask 4-12x12 No. of Cores in Pat. 2
Price per Flask .13 Pat. Received A-3-3
(RETURN THIS SLIP WITH PATTERN.) KEEP PAT. NO. CLEAR
Shortage Pat. Location
Remarks

Pat. No. 160-34 Order No. 7070
WANTED July 10
Pattern Name Inter. Bearing
No. Ordered 300
No. Daily 25
No. Cores per Piece 2
Price .023
Core Room

U. W. Co. DAY WORKERS' DAILY RECORD Page No. 67
Mr. A Johnson No. 104 Molder Bench Floor Machine
Date June 22-16

NAME	PATTERN NO.	CAST	BAD	SMOKED	GOOD	TIME
Guage Bracket	160-40	16	1		15	1¾ hr

(8)

U. W. Co. JOBBERS' DAILY RECORD Form No. 54
Mr. H. Pryer No. 100 Molder Bench Floor Machine
Date June 22-16

NAME	PATTERN NO.	CAST	BAD	BROKEN	GOOD	
Intermediate Bearing	160-34	27	2	1	24	3:12

(9)

Kit No. 100 Date March 10-16
Name H. Pryer

No.	NAME OF TOOL	Price	No.	NAME OF TOOL	Price	No.	NAME OF TOOL	Price
1	Bag, Dust			Hammer, Lead		2	Rammer, Bench	
1	Bar, Rapping		1	" Moulder's			" Large Floor	
1	Bellows			Hook, Large Casting			" Small "	
1	Box, Facing		1	" Small "			" Cornmaker's	
1	" Parting Sand		2	Leggings			" Machine	
	Broom			Mallet, Wooden		1	Riddle #6	
1	Brush, Bench			" Rawhide			Scoop, Coal	
1	" Camel's Hair			Maul, Wooden		1	Shank, Ladle	
	" Flat Varnish			Oiler, M. I.		1	Shovel	
	" Pattern		1	Pail, Water		1	Skimmer	
	Can, Bayberry		1	Pot, Swab		1	Strike	
	" Spray							
1	Clogs, Flask					1	Wire, Vent	

(10)

DAILY MIXTURE SHEET

MIXTURE FOR Light Work DATE June 20-16

CAR NO.	BRAND	LBS. PER CHARGE	PER CENT	SILICON %	SILICON LBS.	MANGANESE %	MANGANESE LBS.	SULPHUR %	SULPHUR LBS.	PHOSPHORUS %	PHOSPHORUS LBS.
29400	Crane	1400	20	2.48	9.72	.67	2.68	.126	.104	76	2.10
45300	Warwick	200	10	2.60	5.20	.90	1.80	.027	.054	.30	.10
13326	Crozer	400	20	2.00	8.00	.98	3.92	.012	.048	.89	3.56
14390	Charcoal	200	10	.44	.88	1.51	3.02	.046	.092	.34	.68
	Miscellaneous	800	40	2.59	20.72	.47	3.76	.084	.672	.68	5.44
Total Lbs.		2000			46.52		15.18		.970		13.56
Gross Sil., Mang., Sul. and Phos.					2.42		.75		.048		.67
Loss by Oxidation and Sulphur Taken Up From Coke			-10	.24	-.20	.15	+	.04			
Net Sil., Mang., Sul. and Phos.					2.18		.60		.088		.67
Mixture Analysis					2.20		.58		.079		.68

Remarks:—

(11)

MIXTURE FOR DATE

CAR NO.	BRAND	LBS. PER CHARGE	PER CENT	SILICON %	SILICON LBS.	MANGANESE %	MANGANESE LBS.	SULPHUR %	SULPHUR LBS.	PHOSPHORUS %	PHOSPHORUS LBS.
Total Lbs.											
Gross Sil., Mang., Sul. and Phos.											
Loss by Oxidation and Sulphur Taken Up From Coke											
Net Sil., Mang., Sul. and Phos.											
Mixture Analysis											

Remarks:—

The production order, Fig. 7, is sent to the pattern man who lays out the patterns, and the superintendent assigns the work to the molders and sets the piece rate. The daily production slip for piece workers, not shown, is made out each morning by a clerk and notes all the patterns which the molder has. It is turned in at night and the count checked the next morning by a clerk. The daily production slip for day workers, Fig. 8, is practically the same as that for piece workers but is of a different color. Fig. 9 is the job record which is kept of work on each pattern. A complete kit of tools is given each man, which is charged out as shown by Fig. 10. On the form Fig. 11 is kept a record of the analysis of each daily mixture.

the storage of patterns. The pattern racks have iron frames with wood shelves. The space over the office and shipping room is equipped with 16 shower baths, 56 individual wash bowls with hot and cold water, and 100 expanded steel individual lockers. Steam pipes are placed below the lockers to dry the workmen's clothes during the night.

Water barrels are located at convenient places in the gangway, the core room and near the cupola. The flow of water into these is controlled by a tank and float valve in the corner of the molding floor which by maintaining the water level in each barrel at a predetermined height does away with faucets and drain pipes and eliminates the possibility of an overflow from any of the barrels by carelessness. Bubblers are maintained at several points in the foundry. The source of drinking water is a well 458 ft. deep.

The lighting of the molding floor is by 1000-watt nitrogen lamps in conical reflectors, one lamp in each bay formed by the columns; 400-watt nitrogen lamps are used for the lighting in the smaller rooms. On each column in the main foundry is a plug for a portable light, and similar plugs are found at many points throughout the plant.

Compressed air for the molding machines and for general use is furnished from the main power plant of the company. Bowes couplings afford a quick means of attaching hose to the air mains.

A gravity carrier is employed in the unloading of pig iron. Each carload is piled separately and marked by a cast-iron sign bearing the brand name and car number. These piles are conveniently near the cupola as the spur track runs close by. The sand bins are also located beside the spur track.

Fig. 12—A Molder's Bench with Plenty of Foot Room and With a Chute to Carry Sand Off to the Side Through Slots in the Bench Above the Chute

Each employee is furnished with a complete working equipment, which is numbered and charged to him. This record is kept on a special form, Fig. 10. The production order form is somewhat unusual. From Fig. 7 it will be seen that it is a long strip of cardboard perforated to form four sections. The entire production order is sent to the pattern man who lays out the patterns and the superintendent assigns the work for each molder. The core room order is put at the left, as it is often necessary to detach this and start work on the cores considerably ahead of the time that the order is issued to the molder. The next section is the order that goes to the molder. The third section is retained in the office and placed on a board

U W Co. DATE June 20-16 No. 1 CUPOLA

	Crane 29400	Warwick 45300	Crozer 13226	Charcoal 14390	LBS. BOTTOM	LBS. SCRAP	LBS. SPRUES AND DEFECTIVE CASTINGS	LBS. AT EACH CHARGE AND TOTAL	LBS. COKE	LBS. OLD COKE	LBS. FIRE SAND	LBS. FIRE CLAY	LBS. CHARCOAL	LBS. MARBLE	EMPLOYEE	HRS.
Charge	400	200	400	200	400		400	2000	1500		300	125			D F	10
Added	400	200	400	200			800	2000		230					H	10
"	400	200	400	200			800	2000	230							
"	400	200	400	200			800	2000	230							
"	400	200	400	200		678	122	2000	230							

(14)

U W Co. BOUGHT OF Alley + Hays

PIG IRON ANALYSIS—BRAND Crozer

CAR NO.	WEIGHT	PRICE	RECEIVED	USED	SILICON	MANGANESE	SULPHUR	PHOSPHORUS
29400	45,200	937.20	4-18-16	9-12-16	2.43	.67	.026	.70

(13)

Pounds of Each	2000	1800	2000	1800	400	678	2922	1800	2190	230	300	125	
Fire Started	2.00	One Pound Fuel, Melted ____ Pounds Iron											350 Lbs. of Coke From Bottom
Blast Put Out	4.10	CONDITION OF METAL			POOR		MEDIUM		SHARP ✓	V. SHARP			
Iron Flowed	4.17	Pressure of Blast in Ounces											REMARKS:
Blast Shut Off	5.05	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME
Dropped Bottom	5.08		4.20										
Actual Melting Time	H. M.	OZ.	OZ.	OZ.	OZ.	OZ.	OZ.	OZ.	OZ.	OZ.	OZ.	OZ.	OZ.
			12										

Good Castings	Defective Castings	Sprues, &c.	Total	Short of Charge
5320	FIRST INSP. 527 SECOND INSP. 486	FIRST COLL. 2962 SECOND COLL. ____ BOTTOM 348	9643	357

Recorded by ____

The cupola man keeps the melt record on a large manila sheet with a heavy pencil. His record is copied on Fig. 13 for the use of the office. Each carload of iron is analyzed and a record kept on the form. Fig. 14, a separate form for each brand.

under the molder's number to show the work on which each is engaged or the work ahead of him. The fourth section goes to the shipper. Tags for rush work are red in color.

The daily record slip of workmen is filled in with the numbers of the patterns in his possession and given to him each morning. He fills it out at night and turns it in. The next morning the count is checked by a clerk. A slip of lemon color is used for day hands and a green slip is used for piece hands.

In this description only a hint has been given to the thought which has been given to the comfort and convenience of the employees. A sincere effort is made not only to make the foundry attractive to the men, but also to the installation of safeguards and to interesting the men in wearing proper clothing and using the utmost care in their daily tasks.

Change in Government Boiler Plate Specifications

WASHINGTON, June 5, 1917.—As the result of protests of manufacturers of boiler plate that the requirements of the rules of the Board of Supervising Inspectors, United States Steamboat-Inspection Service, governing the manufacture of steel boiler plate are too stringent and unnecessarily increase the cost of making boiler plate to meet the regulations, the executive committee of the board has adopted amendments relaxing the requirements for physical qualities of steel plates and for the drilling of tube and stay holes.

Manufacturers claim that the requirements of the existing regulations add from 5c. to 6c. per lb. to the cost of steel boiler plate made to meet the rules of Lloyds Bureau, without in any way increasing the serviceability of the boilers made therefrom. After examining the evidence in support of this claim the executive committee has adopted the following rule for physical quality of steel plates:

> The tensile strength determined by the tests shall be not less than 58,000 lb. per square inch of section, nor more than 73,000 lb. per square inch of section, and the elongation measured in a gage length of 8 in. shall be not less than 20 per cent.

No change was made in the regulation regarding the physical properties of iron plates, the tensile strength of which must be not less than 45,000 lb. per sq. in., with an elongation of not less than 15 per cent. The reduction of area must not be less than 15 per cent for 45,000 lb. tensile strength and for each increase of 1000 lb. up to 55,000 lb. an addition of 1 must be made to the required percentage of reduction of area.

The board further modified the regulations concerning tubes and stays by striking out of section 15, rule 2, the requirement that "all holes for tubes shall be drilled and no part punched" and out of section 16, rule 2, the stipulation that "all holes for stays shall be drilled and no part punched," substituting therefor the following:

> Centers or guide holes not to exceed 75 per cent of the diameter of the full size finished hole for tubes and stays may be punched. The remainder shall be cleanly cut, drilled or reamed to full size.

The amendments have been approved by the Secretary of Commerce and become effective immediately.

W. L. C.

Italy's Large Pig-Iron Output in 1916

The Italian output and consumption of pig iron in 1916 reached record proportions. The production last year is reported as 454,923 tons, against 372,909 tons in 1915, and 424,099 tons in 1913. Imports last year were 302,333 tons as compared with 240,366 tons in 1915 and 221,689 tons in 1913. Included in the 1916 output was 7000 tons of electric furnace pig iron against 2800 tons in 1915. The charcoal iron production was 5090 tons, and the amount of 80 per cent ferromanganese, 4500 tons.

A TALBOT MIXER

Two Hearths Provided with a View to a Better Refinement of the Crude Metal

To enable the crude metal in the process of making steel to be more or less standardized before its introduction into the furnace for final treatment and to effect a better refinement than is possible with the present mixer, Benjamin Talbot, Middlesbrough, England, has recently acquired patent rights in that country protected by him in 1903 and 1904. Mr. Talbot proposes to employ two or more tilting hearths, separated by chills, but so arranged as to be practically a single furnace having separate hearths, each of which forms an active mixer and can be separately tilted, while the whole furnace can be worked by a single set of men.

Assuming the hearths to be empty, which would only be the case when starting the furnace, one-half is filled up as rapidly as possible by emptying into it the liquid pig iron, and when full the filling up of the next hearth is commenced. Meanwhile the metal in the first hearth is treated as may be desired. Thus, if sulphur is the chief element it is desired to remove, the metal is kept quiescent, and the sulphide of manganese slag which rises to the surface is removed from time to time until sufficient purification is effected, when the metal may be drawn off for final conversion in the steel furnace. If silicon be the element it is wished to diminish, the required amount of lime and oxide of iron can be added, but the slag should not be worked so basic as to cause a partial removal of the phosphorus, it being more economical to remove the whole of the phosphorus at one operation, either in the preliminary furnace or steel furnace.

With this system of storage it is claimed that a considerable amount of refining can be accomplished without any hindrance to the blast-furnace plant, or delay in providing partly refined metal for the steel furnaces. Further, there is an advantage in dividing the liquid metal from the blast furnaces into separate hearths, as the refining can thus be continued and a standard product be obtained, as is not possible with a one-hearth storage furnace plant, into which the metal from the blast furnaces must of necessity be delivered, although the hearth probably contains partly refined metal, thus throwing the whole charge back in both purity and temperature. Only a slight improvement in the contained pig iron is possible in such a furnace.

Improved Hearths for Electric Steel Furnaces

In the ordinary method of making hearths in electric furnaces, a complete bottom of magnesia with tar binder is rammed in cold and then fritted in place by placing a layer of coke on the bottom and passing the current through by lowering the top electrodes. The fritting penetrates only a few inches, leaving the lower part of the bottom still granular. In this condition the hearth or bottom is sometimes easily destroyed when the fritted surface breaks through.

An improvement in making such hearths is covered by a patent (U. S., 1,220,839—March 27, 1917) granted to James H. Gray of the United States Steel Corporation, 71 Broadway, New York. In his patent it is proposed to introduce a layer of granular magnesia, one or two inches thick, on the lining of magnesia bricks resting on the shell of the furnace. This layer of magnesia is then brought to a molten or semi-molten condition, taking advantage of the fact that magnesia and similar materials are fairly good conductors of electricity at high temperatures. Added layers are thus fused until the desired depth and shape is a sound and reliable monolith. Details of the procedure are outlined in the patent.

The Municipal Civil Service Commission, New York City, will receive applications until June 13, 1917, for the position of mechanical engineer to perform engineering work in connection with the mechanical equipment of buildings, the design of machinery or in connection with power or heating plants.

ELECTRIC RESISTANCE FURNACE*

For Melting 90-Lb. Charges of Nickel-Silver Scrap in Crucibles

SOME years ago the authors carried out a series of experiments with the object of improving the quality of a range of nickel-silver alloys currently produced at their works for subsequent rolling into sheet metal. In the electroplating trade up to two-thirds of the sheet metal is returned to the melting pot as scrap, and any fresh nickel required in the melting charges is previously alloyed with copper.

Observation showed that the properties of these alloys were greatly influenced by impurities, and that the conditions of melting played an important part in the production of material with the best working qualities. Bearing in mind the necessary utilization of scrap, it is obvious that any contamination due to the fuel, e.g., sulphur, would tend to be cumulative.

It was found that in the following respects gas offered advantages over coke: The greater ease of regulating the heat and maintaining a slightly reducing atmosphere; lower sulphur content and greater ductility of the alloy.

The disadvantages of gas compared with coke, were: Noise, fumes and hot gas when furnace uncovered for charging, etc.; decreased life of plumbago crucible; greater zinc losses, owing to rapid currents of gas, and slower melting, a point of vital importance for ordinary commercial work.

The fuel costs of working with gas of 560 B.t.u. at 25 cents per 1000 cu. ft. and coke at $6.75 per ton, were sufficiently close for practical purposes.

An electric furnace of the resistance type large enough to take the usual 100-lb. crucible was expected to have the following advantages over a gas furnace: Owing to its quiescent state the atmosphere of the furnace would be completely reducing (since carbon could be introduced into the pot or into the furnace chamber), while loss of spelter would be greatly diminished; much less sulphur contamination; greatly enhanced life of the crucibles, and improved quality of the metal.

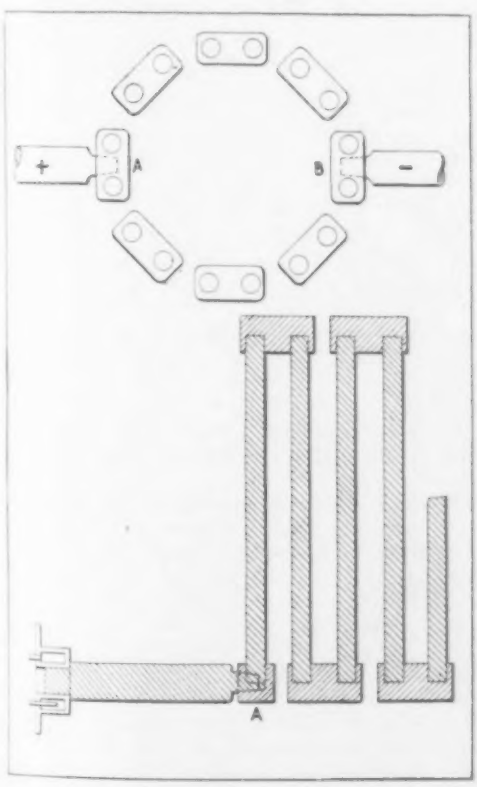


Fig. 1—Arrangement of Resistors

The general form of the furnace is shown in Fig. 1. Sixteen carbon rods 1 in. diameter and 19 in. long were arranged in a 13-in. circle, and connected by graphite blocks alternately at top and bottom to form two parallel sets, each of eight rods in series. Current was supplied to the two sides of the circle by graphite rods ground into holes in the blocks *A* and *B*, the carbon rods making electrical connection in the same manner.

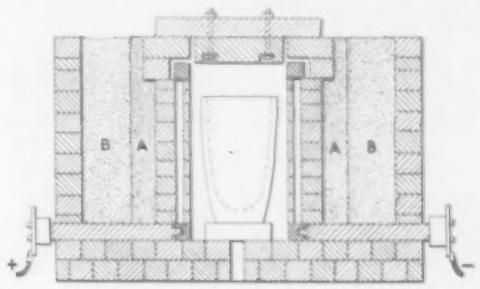


Fig. 2—Arrangement of Electric Resistance Furnace for Crucible Melting

The graphite rods were soldered into water-cooled terminal blocks, to which the supply cables were bolted. To protect the carbon rods from oxidation a mixture of carborundum fire-sand and sodium silicate solution was patted round them. The recommended method of heat insulation is shown in Fig. 2, the inner layer **A** consisting of carborundum fire-sand or ordinary sand, and the outer one **B** of Kisselguhr.

The table below gives the particulars of a run on the furnace, using charges of 90 lb. of nickel-silver scrap:

Time from Start, Min.	Current, Amp.	Voltage on Furnace	Kilowatts on Furnace	Remarks
..	200	64	12.8	Crucible put in
30	240	71	17.0	
60	280	68	19.0	
90	300	64	19.2	
120	310	60	18.6	
180	310	60	18.6	Melt finished and removed
..	280	65	18.2	
30	290	63	18.2	
60	300	61	18.3	
95	300	61	18.3	Melt finished and removed

In the above test the times of melting were 3 hrs. and 95 min. for the first and second heats respectively, while the energy consumptions were 53.6 and 29.2 kw.-hr. respectively per 90 lb. of metal melted. On the basis of five heats per day (the furnace being started up cold every morning), and assuming the last three heats to require the same energy consumption as the second, the average energy per cwt. would be 42.5 kw.-hr.

Although this cost is rather high, it would be largely compensated for by the greatly increased life of the plumbago crucible. After several heats the new crucible used showed practically no change in appearance, not having suffered glazing or removal of graphite by oxidation. Crucibles heated in gas furnaces flake very badly owing to the latter cause after a few heats.

Remembering that one could probably considerably increase the efficiency of the furnace on which the above estimate is based, the cost of electrical melting would seem to be not prohibitive, at any rate for special qualities of nickel silver used for difficult spinnings, etc., which demand the highest possible ductility.

The actual thermal efficiency in the furnace was about 22 per cent, as compared with about 6 per cent, in the case of gas heating.

*From a paper read before the Institute of Metals (Great Britain), March 22, 1917.

The Hudson Trading Company, exporter of steel and iron products, announces its removal to suite 1105, 18 East Forty-first Street, New York, where it will occupy larger quarters.

The William C. Johnson & Sons Machinery Company, St. Louis, Mo., has removed from 210 Washington Avenue to 1001-3-5 North Sixth Street.

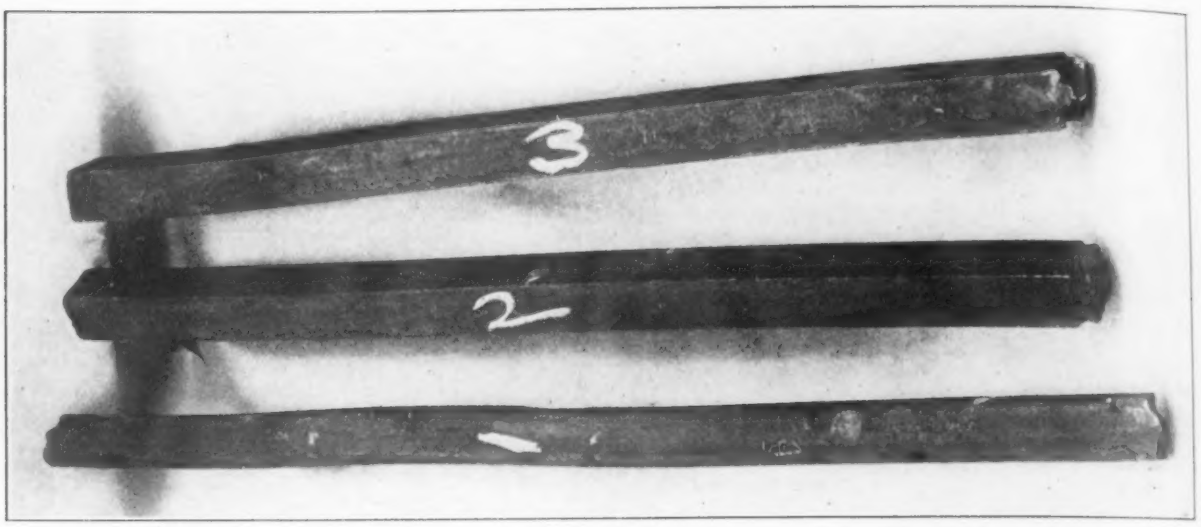


Fig. 1—Bars 2 and 3 Were Rolled in a Hawthorne Mill and Do Not Show the Ruptures Noted in Bar 1

NEW UNIVERSAL MILL

Rolls All in One Plane and Product Free from Cracks and Flaws

Starting with the charge that the process of rolling steel is being carried on to-day just as it was 50 years or more ago, particularly in blooming mill work, and that in all this time rolled steel has been subject to those troublesome defects commonly known as slivers, cracks and flaws, Charles W. Hawthorne, superintendent of rolling mills, Wickwire Steel Company, Buffalo, N. Y., has supplied to THE IRON AGE some particulars regarding a universal rolling mill on which he has been granted a patent. Mill design, he agrees, has been changed and mechanical parts, such as housings, manipulators, screw downs, etc., have been improved from time to time, but the process of reducing the steel to smaller sections, he maintains, has never been altered. The new design of mill, he asserts, is devised particularly as a break-down blooming mill to prevent the cracking or fracturing of the steel. Nowadays in the open-hearth department all sorts of schemes are tried to secure a product that may be rolled into bars and present itself faultless to the inspector's eye. Heating furnace and soaking pit practice has been altered to accomplish the same purpose, but, as Mr. Hawthorne expresses it, "the dirge of the chipping hammer is ever growing louder and louder as it pounds its way into the wreck and ruin and destruction wrought by the mighty crush of the rolls. A blooming mill roll can do more damage in 5 minutes than a chipping hammer can do in 5 hours."

Fig. 1 shows three bars of steel rolled from small ingots. The ingots were identical in size, shape, quality of steel and all heated at the same time in the same manner. The rolling, however, was different. Bar No. 1 was rolled in the usual manner, the manner of rolling that is daily being employed. The ruptures in the steel there shown are pointed to as proving the destruction wrought by the rolls. Bars 2 and 3 were rolled according to the Hawthorne idea and the photographs were reproduced to show the absence of torn and fractured metal.

Fig. 3—When a Solid Horizontal Roll Was Used, the Disk No. 1 Showed Excessive Wear, While When the So-called Compensating Device Was Employed, the Disk, Indicated by No. 2, Showed No Wear

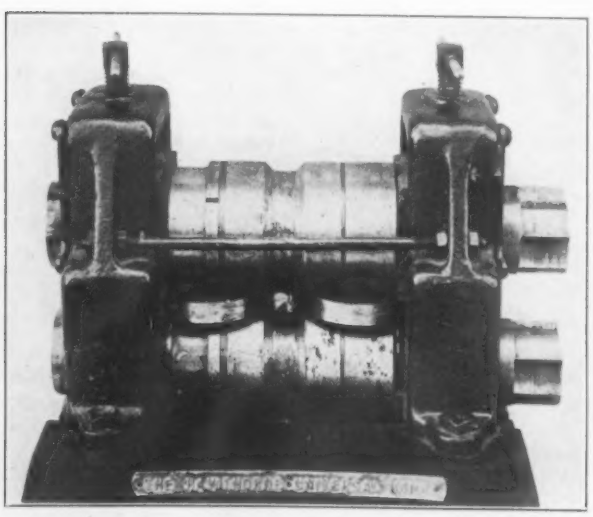


Fig. 2—Hawthorne Mill Designed to Work on the Bar Over Its Entire Perimeter, Putting Horizontal and Vertical Rolls in the One Vertical Plane

Fig. 2 shows the mill in which bars 2 and 3 were rolled. It is purely a universal mill wherein the bar is worked upon about its entire circumference, all the work being in one vertical plane, as contrasted with the universal mill in which the horizontal and vertical rolls are in tandem. The vertical rolls are disks beveled on their inner surfaces and held in place and self-adjusting by their contact with the beveled collar of the horizontal rolls. The collars of the horizontal rolls are loose sleeves backed up by bronze wearing rings, all being built up on the roll in a unique way, providing a compensating arrangement for wear.

Fig. 3 shows two disk rolls. No. 1 was used with a solid horizontal roll and shows excessive wear, while No. 2 was used with the compensating device and shows no wear. Fig. 4 shows the manner in which the horizontal roll is built up.

The rolling of the bar is always of a square cross section. There is no slabbing and edging and displacing of the particles of steel in an abnormal manner, Mr. Hawthorne emphasizes. No manipulators are necessary with this mill and he points out that so-called turndowns are impossible and therefore no heavy machinery is necessary to hold the bar up in the pass. A crooked

or distorted or twisted bar, he claims, will naturally correct itself in this mill; all that is necessary is an ordinary table with a tumbling device.

The mill is for rolling symmetrical shapes such as I-beams, rails, flats, etc. Fig. 5 illustrates the mill for rolling I-beams.

ELECTRIC ANNEALING FURNACE

Very Long One for Strip Steel—Other Uses for the Baily Furnaces

AN electric annealing furnace 193 ft. long is the latest development in the rapid strides now being made in the application of electricity to industrial uses. It is now being built for use by a large company in the Pittsburgh district for annealing bright strip steel and it is guaranteed that the steel will come out of the furnace as bright as it went in. The new furnace is being built by the Electric Furnace Company, Alliance and Cleveland, Ohio, of which T. F. Baily is president. Mr. Baily made this announcement during the discussion of a paper on "Annealing and Heat Treating Steel and Melting Non-Ferrous Metals in the Electric Furnace," which he presented May 15 before the Cleveland Engineering Society.

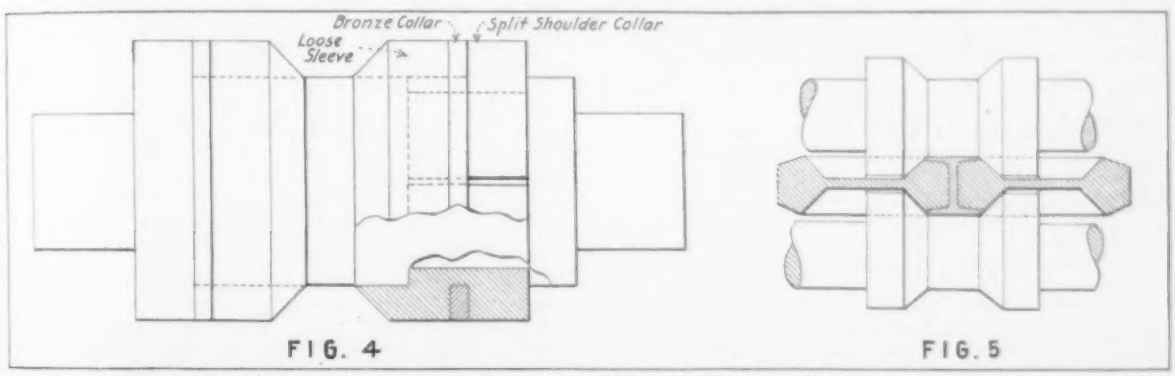


FIG. 4

FIG. 5

The Horizontal Roll of the Hawthorne Universal Mill Is Built Up as Shown in Fig. 4 with a Bevel Collar to Provide Self-Adjustment with the Beveling of the Vertical Disk Which it Holds in Place. An assembly of the rolls for rolling a beam is shown in Fig. 5

The paper was illustrated with a number of lantern slides showing various installations of Baily electric furnaces. The speaker stated that the uncertainty of fuel supply and its increased cost have in the past year materially aided the introduction of electric furnaces on a considerable scale and central stations, which formerly showed a lack of interest in electric furnace development, have of late taken an active interest in their introduction. The following were given as some of the uses to which furnaces of the type referred to have been put: Annealing steel castings and car axles, heat treating steel castings and shells, carbonizing, annealing aluminum, copper and brass, and melting copper, brass, aluminum and silver.

To these Mr. Baily said will be added shortly, electric soaking pit furnaces for steel plants and rivet furnaces for structural and bridge shops and later electric furnaces for heating drop forgings when there is a demand for an electric furnace for this purpose. Furnaces referred to in the paper and illustrated included the car type of annealing furnaces, continuous pusher type furnaces, automatic heat-treating furnaces and brass melting furnaces. He said that the automatic heat-treating furnace is being used for heat treating cast-steel drawbar knuckles and large high explosive shells.

While the first cost of furnaces of this type is high, it had been shown that they approached very closely the highest point of commercial efficiency, for they not only leave no operation to chance, but reduce the labor item to a minimum. He believed that it could be said of one of these installations that hundreds of thousands of pieces had passed through the furnace without a greater variation in the temperature than 10 deg. from the stipulated point. This type of furnace, he said, was suitable when the material to be heat treated is of uniform section or can be placed in suitable metal containers or where extreme accuracy of the reduction of labor cost to a minimum is desired.

Melting Non-Ferrous Metals

In referring to the use of the electric furnace for melting non-ferrous metals Mr. Baily said that the tilting type is the one offering the greatest saving in cost over fuel fired furnaces of any type; as the metal loss is lower, the crucible cost is eliminated and the labor item is low. It was stated that the following figures may be taken as operating conditions in melting yellow brass in a plant operated 24 hr. a day:

Electricity 400 kw.-hr. per ton at 1c., $4 per ton; metal loss, 1 per cent zinc at 10c. per lb., $2; labor, one man per hour per 600-lb. at 40c. per hour, $1.20; total cost per ton of metal, $8.20.

Mr. Baily furnished additional information in reply to many questions from his audience. S. T. Wellman said that one of the best uses for electric furnaces of the type referred to is in melting brass and aluminum and metals along that line, especially those requiring only a low temperature. He said the saving of metal is a very important item and ought to put the electric furnaces in every plant that melts any quantity of these metals.

In reply to questions, Mr. Baily said that when a brass melting furnace was shut down from 5 p. m. to 3 a. m. it took 4 hr. to get the furnace up to the working temperature of 2500 deg. Fahr. The brass furnace is operated on a power factor of about 98½ per cent. He was unable to tell the average life of the lining of the furnace. Regarding the life of electrodes, he said tha tin one furnace, operated at 2500 deg. a new pair of electrodes is put in every seven months. At another plant the average life was about three months. On a basis of 10-hr. operation, he stated that it is feasible to shut the furnace down. The temperature will drop from 2400 to 1900 deg. in the 14-hr. cooling and it will take 4 hours to bring it up again. The average current of 400 kw.-hr. per ton was for constant operation. In ordinary industrial use, the furnace operation, where current is required to bring the furnace temperature up again, an extra 500 kw. should be allowed. Without considering the metal loss with current at 1c. per kw.-hr. he estimated there would be a saving of $6 to $10 per ton over using $8 coke.

Mr. Baily recommended that foundries having varieties of mixtures to melt, continue to use crucibles. In case of delay in pouring and the metal is kept hot in an electric furnace, the zinc loss is increased, but not so much as in open-fired furnaces or in crucibles. The temperature cannot be kept down in this case, as it takes 15 min. to get any effect from turning off the current.

No attempts have been made to use electric furnaces for annealing large forgings, but it is expected that contracts would be placed for equipment for annealing forgings and shafts 42 ft. long. This would be an adaptation of the car type annealing furnace. In speaking of the large electric annealing furnace referred to and now being built for annealing bright strip steel on cars, the cars will move continuously through it. With current at 1c. per kw.-hr. the cost would be approximately $1 a ton.

Producer Gas and Its Industrial Uses*

Detarring and Cleaning by Electricity—Application in Heat-Treating Axles by the Ford Motor Company—Cost of the Gas

BY F. W. STEERE

ONE of the greatest problems now confronting industry is, undoubtedly, the fuel problem. It is the same old story of prodigal waste until we suddenly find ourselves face to face with a real shortage.

The subject of this discussion is to consider the possibilities of one of the methods of utilizing soft coal, that is, by converting it into producer gas. This gas is by no means the panacea for all our ills, but it has its place, and our duty now is to determine to what extent its use can be applied in conserving our natural fuel supplies.

For many years producer gas has been successfully used in metallurgical work for heating large furnaces, for melting glass, etc. These operations are carried on with hot producer gas, that is, the gas from the producer offtake, which is usually at a temperature of from 1200 to 1400 deg. Fahr., is led directly to the furnaces through brick-lined flues. Producer gas made from soft coal carries large quantities of tar, soot and dust in suspension. It is impossible to keep a large part of this solid matter from being deposited in the flues between the producer and the furnaces. This deposit must be periodically removed by "burning out."

Types of Producers Making Clean Gas

The only practical means for utilizing producer gas in the great variety of heating operations which are found, for instance, in the automobile industry, is to clean the gas completely of all suspended matter and cool it to normal room temperatures. It then can be distributed through any system of piping the same as ordinary city gas.

The big problem has always been to make a gas free from both tar and soot. This difficulty of getting clean gas has, undoubtedly, had more to do with the slow development and adoption of producer gas than all other things combined. Two general types, or classes, of producers have been developed, the distinguishing characteristics of which are the methods of cleaning the gas:

1. Producers where it is attempted to convert all of the tar to a fixed gas before leaving the producer.
2. Producers which make a tarry gas and rely on outside apparatus for cleaning it.

Suction and pressure producers are found in both of these classes.

The producers of the first class are built on the theory that if the hydrocarbon vapors, tar oils, etc., which go to make up the very complicated combinations of material that are usually designated as "tar," are brought in intimate contact with highly heated surfaces, these tar constituents will be cracked to fixed gases. The down draft producers, double zone producers, and underfeed producers illustrate this class. In these machines the gas is made to pass through the heated portions of the fuel bed, relying on the contact with the incandescent coke to bring about the cracking.

All of the simpler forms of producers, where the fuel is charged at the top and steam and air are blown in at the bottom, come under the second class. The tarry vapors which are distilled from the top of the producers, obviously, pass out with the gas and must be cleaned by some external means. This problem of removing tar from gas made in producers of the second class, has been attacked from almost every conceivable angle, such as washing, scrubbing, complicated spray systems, deflectors, centrifugal and whirling machines of almost infinite variety, filtering, pressure and sudden expansion, and precipitation by high tension electrical discharges.

Detarring by Electricity

The high tension electrical process for detarring gas was invented by the author in 1911. The following extract from a paper entitled "An Electrical Process for Detarring Gas," which was read before the American Gas Institute in 1914, describes what takes place in the "Ionizer" where the gas is passed through the high tension electrical discharges:

An opportunity was provided at the Detroit plant of the Semet-Solvay Company to work out these ideas and develop the theory on which this work is based. This theory, although far from complete, has proved sufficiently accurate to guide us in perfecting a detarring process which is in commercial use to-day.

In attempting to briefly outline the electrical action, we must keep in mind first that the gas molecules themselves possess both positive and negative electrical constituents which can be separated by X-rays, beta and gamma rays of radium, brush discharge from points, corona discharge from wires raised to high potential, ultra-violet light, etc. This process of separating neutral gas molecules into electrically charged parts or ions is called "ionization." It is outside the scope of this paper to attempt to discuss the ionic theory, but it should be noted that ions as such are very unstable and cease to exist, that is, recombine to form neutral molecules, almost the instant they are outside the ionizing influence. A very few molecules are continually splitting up, presumably because of the trace of radio-active substances found in most gases as well as in the atmosphere.

Professor Millaken of the University of Chicago has studied the movement of a small drop of oil between two oppositely charged condenser plates when attacked by atmospheric ions. The drop receives a charge when atomized, so by throwing on and off the electrical field, the drop is made to beat up and down between the plates. The instant an ion attaches itself to the drop the fact is made known to the observer by its change in speed, this change depending on the sign of the ion and the charge on the drop. The important and interesting thing to note is that with over a thousand drops studied in this way, the change of speed was always exactly proportional to the number of ions attached to the drop.

Let us recall that there are about 27 billion molecules in 1 cu. cm. of ordinary air and that each molecule may be separated into at least two ions. When just one of the possible 54 billions ions per cu. cm. attached itself to the oil drop it instantly caused an appreciable change in its velocity. Imagine then the violence with which this drop would have been thrown about if all the molecules surrounding it had been ionized.

This is just the condition we bring about in the electrical detarrer. The gas carrying the minute tar globules is swept into an intense ionizing field. Billions of gas molecules on every side are being torn apart. The resulting ions rush madly about in their effort to recombine. The unsuspecting tar globules find themselves in a storm center of unseen forces hurling them in every direction. The time occupied in the passage of the tar particles through the electric field is brief and it might naturally be supposed, as it heretofore has been, that an aimless to and fro movement of them would be the result of applied energy. It would, however, be hard to conceive of a condition more favorable to impact between tar particles, and experience shows that either because of this impact or for some reason as yet unknown, agglomeration results and the dense tar mist is almost entirely dissipated, leaving a relatively few large tar drops in its place. This rather figurative description will seem more real to those who have witnessed this remarkable phenomenon within a glass vessel filled with dense fumes or fog. The instant the current is turned on the whole field can be seen to clarify. The commercial importance of this becomes more apparent when we realize that this action can be brought about at almost any desired temperature.

No attempt is made to free the gas of these agglomerated tar particles while it is still in the ionizing field. The appa-

*From a paper read before the Society of Detroit Chemists, May 17, 1917, a local section of the American Chemical Society. The author is president of the Steere Engineering Company, Detroit.

ratus is so arranged that everything is swept on through into some form of mechanical extractor, where a complete removal is effected with very little power loss.

The whole process may be summed up in this: It is practically impossible to free the gas from tar in the extremely fine state of subdivision which naturally results from rapid condensation. There is no difficulty in removing relatively large drops, and the electrical treatment simply converts the fine mist into the large drops.

Enormous sums of money have been expended in attempting to perfect a commercial process, that is, a process which would deliver clean gas of uniform calorific power continuously. The great difficulty which has always been met lies in the fact that the success of any gas-making process depends almost entirely on the skill with which it is operated. Machines and processes may give perfect results in the hands of the inventors, or skilled operators, but when they are sold promiscuously and are handled by unskilled, or indifferent, operators, the result is failure. This has been the history of the gas producer development for years past, with the result that all clean gas producer development work is looked upon with a great deal of suspicion.

Gas Heat-Treating Furnace for Axles

To illustrate the possibilities of producer gas firing, a set of furnaces which we have designed and built for the Ford Motor Company at Detroit, for heat treating front axles, is here described. Three heat treatments are required. After the first heating, the axles are allowed to cool in the air by radiation. After the second heating, they are quenched. After which, they are again heated to a lower temperature and allowed to air cool. These furnaces are so designed and laid out that the axles are pushed mechanically through the first furnace and kept moving for a space of about 10 ft., until they reach a temperature within 50 deg. of room temperature. They are then mechanically fed into the second furnace, pushed through and quenched. A conveyor carries them from the quenching tank to the feeding mechanism of the third furnace, where they receive their final heating and are pushed out the rear end ready for the machine operations.

It will be noted that the axles are handled mechanically throughout the process, and after being fed into the first furnace, do not stop until the three heat-treating operations are complete. These three furnaces have a capacity of completely heating one front axle per minute. Although the heats are different in each furnace, the three furnaces are duplicates, with the exception of the draft and damper settings to bring about the required temperatures.

The hearth is 5 ft. wide by 14 ft. long. The axles are placed on specially designed cast-iron ways with the forks hanging down. When the furnace is filled with these axles, the axles themselves form a practically solid floor which moves along through the furnace over the ways. Small pieces, such as cam shafts, spiders, spindles, etc. are piled on top of the axles and are carried through the furnace, receiving exactly the same heat treatment as the axles. These small parts are handled by hand between each furnace, as no mechanism has, so far, been designed to handle them mechanically. The gas and air are delivered through the reversing valves to the regenerators at a pressure of approximately 3 in. of water. The four regenerators are placed directly under the hearth, the gas on the inside and the air on the outside. There is one combustion chamber immediately over each pair of regenerators and immediately under one-half of the hearth and extending under its entire length.

The products of combustion pass through flues along the sides of the hearth, sweep over the hearth, down through the flues on the opposite sides, divide after passing through the opposite combustion chamber, and pass down through the opposite pair of regenerators, through the reversing valves and out the stack. The furnace is reversed on an average of every 15 to 20 min. The products of combustion, while passing over the hearth, are directed by a series of jack arches placed every two feet at right angles to the movement of material over the furnace hearth. A solid division wall, built from the foundation to the hearth, separates the two pairs of regenerators. The furnace is inclosed in a steel jacket with 2½ in. of insulating material between steel and brick work.

We have built this type of furnace with a muffle to prevent the products of combustion from coming in contact with the steel, the idea of the muffle being to reduce the scaling to a minimum. The average gas consumption with the muffle was 264 cu. ft. of gas per minute, the average cubic feet of gas per ton of stock being 22,970. The efficiency of the furnace was 14½ per cent.

With the same type of furnace, running under exactly the same temperature conditions and delivering the same amount of stock, without the muffle, that is, the products of combustion coming in contact with the steel, we find that the average gas consumption was 73 cu. ft. of gas per minute, or 11,500 cu. ft. of gas per ton of stock, with a furnace efficiency of 26 per cent as compared with 14½ per cent as stated above. By furnace efficiency is meant the total amount of heat put into the stock, divided by the total amount of heat delivered to the furnace in the gas.

From these comparisons, the cost of operating is very much greater when the muffle is used and the practical results on this kind of stock, with skillful operation, are about the same in both cases. We find that the temperature of the stock heated in the furnace can easily be kept within a variation of 10 or 15 deg. By skillful operation, there is no difficulty in keeping the temperature variation within 5 deg. These results have been obtained over tests of several months' duration. The Ford Motor Company is adding six additional front axle heat-treating units of the Steere Engineering Company design, which will probably be in operation by the first of July.

Cost of the Gas

The cost of producer gas necessarily varies with the price of coal, water, labor, investment in plant, hours operated daily, etc. The labor and capital charge varies also with the size of the plant. For example, take a plant with a capacity of 3 million cu. ft. of gas per 24 hr., with coal at $3 per ton, producer gas will cost 4¾c. per 1000 cu. ft. A plant with a capacity of 15 million cu. ft. per 24 hr. and coal at $3 per ton, the gas would cost 4¼c. per 1000 cu. ft. On a B.t.u. basis, this corresponds to 4¾c. and 4¼c. cil, respectively. It must be kept distinctly in mind, however, that these figures are costs of the fuel delivered to the furnace and do not take into account capital charges of the distribution system necessary, capital charges on the furnace investment, repair of furnaces, etc. In other words, it is the total cost of the fuel ready for distribution, rather than the cost of heating stock.

The following data are the result of continuous tests taken on the above described front axle furnace from April 1 to 20:

Output of furnace tons per hour	0.781
Cubic feet of gas per hour	9,000
Cubic feet of gas per ton of stock	11,500
Calorific power of gas, B.t.u. per cu. ft.	127
Cost of fuel per ton metal (gas at 3½c. per M)	$0.401
Cubic feet of gas per minute for "furnace standing by"	73
Cost per hour for fuel for "furnace standing by" with gas at 3½c. per M cu. ft.	$0.154
Pounds of stock per hour per sq. ft. of floor space	9.1
Per cent of total heat supplied furnace into stock, that is, efficiency of furnace	26
Per cent of total heat supplied furnace to stack	8
Per cent of total heat supplied furnace to radiation	66

In the above test the fuel supplied the furnace was measured by means of a station meter. This meter measured the gas supplied to two furnaces, the gas being divided between the two furnaces by means of Pitot tubes installed on both furnaces.

The amount of heat that went into the stock was determined from the rise in temperature of the stock, and its specific heat. This specific heat was determined by laboratory experiment and found to be 0.12.

In the above data, special attention is called to the calorific power of the gas, which is only 127 B.t.u. per cu. ft. The reason for this low B.t.u. is that the gas was made by gasifying pea coke. This also accounts for the low cost of the gas per thousand cubic feet. This gas would be equivalent to ordinary producer gas at 4c. per thousand cubic feet.

This particular test has been selected out of a great

many run to show that a very weak gas can be effectively used in a properly designed furnace, which is contrary to the general opinion that a weak gas cannot be effectively used. The results of these tests check very closely with the average of a long series of tests on gases of different calorific power.

Advantages of Producer Gas

Briefly, the advantages of producer gas may be summed up as follows:

It furnishes a dependable fuel supply under your own control, that is, it is as dependable as coal.

It can be used for all classes of heating work, including enameling.

The flame temperature being low and the gas volume large, there are no intensely hot spots in the furnace—with the result that repairs on brick work are next to nothing.

The highest furnace efficiencies are possible with gas.

In every application that we have studied we have found that the costs were less with producer gas than with oil.

More uniform heating of the stock and more accurate control of temperatures were possible.

Also it must be kept in mind that the application of clean producer gas to industrial heating operations may be considered as an infant industry. From our observations to date, however, we feel that the infant is rapidly growing and that the future of this fuel is assured.

BUYING BONDS FREELY

Many Companies Make It Easy for Their Employees to Pay

The Lakewood Engineering Company, Cleveland, has presented its employees a plan under which the latter will be able to buy one or more $50 Liberty bonds with payments extending over a period of weeks. An employee wishing to buy a bond will make 24 weekly payments of $2 each, or a total of $48, and the company will pay the final instalment of $2. Thus the employee receives interest of $1.75, making the net cost of a $50 bond to him $46.25. The company will furnish as many bonds as its employees desire to buy on this basis. The bonds will be held by the company until fully paid, and a receipt will be given to the employee for each weekly payment. In case an employee leaves the company, the receipts are redeemable at the company office at their face value. Where it is desired to buy a bond outright, the employee can do so by making a cash payment of $48, the company paying $2.

The American Rolling Mill Company, Middletown, Ohio, has subscribed for $500,000 of Liberty bonds for the purpose of protecting such subscriptions as the employees are willing to make. The importance of the employees' subscribing is being presented to them, and it is being made possible for them to make the payments on very easy terms.

The Globe Seamless Steel Tubes Company, Milwaukee, Wis., has made an offer to each employee to present one $50 Liberty bond to each one who subscribes for one or more of the certificates of the same denomination, and further, will finance deferred payments for the purchasers. The bonus bond will be given at the end of the year, providing that records show regular attendance at employment.

The Joseph Dixon Crucible Company, Jersey City, N. J., has subscribed for the purchase of $1,000,000 of Liberty bonds.

Employees of the Thomas A. Edison Companies, West Orange, N. J., have pledged themselves to purchase $300,000 worth of Liberty bonds. A campaign is now being conducted throughout the works.

Liberty bond subscriptions among the employees of the Solvay Process Company and the Semet-Solvay Company, Solvay, N. Y., have reached a total of $180,450. This does not include officers' subscriptions nor those placed by office employees through banks.

Employees of the Continental Can Company, Syracuse, N. Y., have subscribed $11,500 for Liberty bonds. Subscriptions for the fund are being received daily.

The E. I. du Pont de Nemours Company, Wilmington, Del., has adopted a plan to allow its employees, totaling about 66,000, to purchase Liberty bonds on installments. Four per cent is to be paid at the time of purchase, and 8 per cent a month thereafter until the bonds are fully paid.

The Victor Talking Machine Company, Camden, N. J., and employees have subscribed for Liberty bonds to the extent of $712,000. It is expected to increase this amount with later subscriptions.

The Crucible Steel Company, Harrison, N. J., has adopted an installment plan for Liberty bond purchases by employees.

Employees of the Fitzgibbon & Crisp Company, Trenton, N. J., manufacturer of automobile bodies, have subscribed for $4,350 of Liberty loan bonds. Every employee of the company has taken at least one bond of $50 denomination. An installment plan has been arranged to allow the purchase at a minimum of $1 weekly.

The Phoenix Iron Company, Philadelphia, has subscribed for $250,000 of the Liberty bonds.

Employees in the steel foundry department of the Central Iron & Steel Company, Harrisburg, Pa., have subscribed to a total of $5,000 of Liberty bonds. Further subscriptions are being received, and it is expected to increase this amount.

Employees of the Straight Line Engine Company, Syracuse, N. Y., have subscribed to the Liberty bonds to an amount of $5,800. The company has adopted a plan to assist the men in purchasing by paying 10 per cent of the price.

At a first meeting for creating a Liberty bond fund, employees of the Syracuse Malleable Iron Works, North Geddes Street, Syracuse, N. Y., have subscribed $7,350, divided into 127 subscriptions.

Liberty bond sales among the employees of the Halcomb Steel Company, Syracuse, N. Y., have reached a total of $15,000.

With the exception of one employee who has enlisted, it is said that every worker at the plant of the Syracuse Chilled Die & Casting Company, Syracuse, N. Y., has subscribed for Liberty bonds.

An Aluminum-Calcium Alloy

A new alloy of aluminum and calcium, for which unusual properties are claimed, has been invented by Hugh S. Cooper, Cleveland, U. S. Patent 1,224,362, issuing on May 1. The proportion of calcium is about 10 per cent, and the alloy is said to be harder and more durable as well as more easily machined than aluminum alone. It also has a lower specific gravity than aluminum, rendering it particularly valuable in the manufacture of light castings for automobile and airship use. Such castings should possess low specific gravity, good machining properties, freedom from brittleness, and be capable of taking the finest impressions from the mold. The new alloy, it is claimed, meets these conditions well. Aluminum alone is too soft for most commercial uses, the practice being to add copper, zinc or tin. These additions, however, considerably increase the specific gravity. The aluminum-calcium alloy is from 5 to 20 per cent lighter than aluminum, much harder, and more resistant even to corrosion. An added advantage claimed is the purifying effect of the calcium, neutralizing the tendency of aluminum to oxidize or removing the oxides if they form. The alloy does not decompose water, and can be remelted as easily as aluminum itself. The rather difficult operation of alloying the calcium with the aluminum is described in the patent.

The Superior Steel Company, Carnegie, Pa., producing iron and steel bars, etc., has acquired 60 city lots adjoining its plant for a consideration of about $35,000, for proposed extensions to increase the capacity of the works.

A. Allan & Son, manufacturers of alloy bearing metals, are now located in their new plant at Harrison, N. J. Since its foundation in 1891, the firm has been located at 486 Greenwich Street, New York.

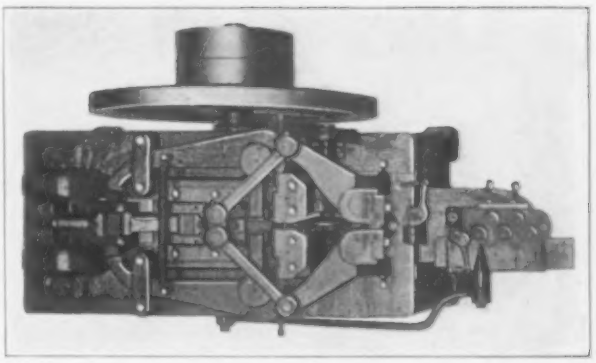
A New Line of Wire Nail Machines

A new line of wire nail machines is being built by Sleeper & Hartley, Inc., Worcester, Mass. Among the features which differentiate these machines from others now on the market are the employment of toggle joints actuated from a single crankshaft to provide the working motions, the separation of the pointing and heading operations and a reduction in size, weight and floor space occupied.

The machine consists of a frame or bed of massive reinforced construction mounted on double legs. The working members are mounted on top of the frame in such a way, it is pointed out, that they can be lifted off and the machine stripped down in a few minutes. Rotating cams have been entirely eliminated, a single crankshaft controlling the working motions through toggle joints. The operation is said to be smooth and practically noiseless, the power applied being expended in making nails and the wear and tear upon the machine is consequently reduced. The pointing and heading operations have been separated, thus, it is emphasized, reducing the heating effects upon the dies to a great extent and distributing the working stresses more widely. This separation is effected by the use of an intermittently operated carrier wheel interposed between the pointing and heading positions. A series of holding jaws are provided for the wheel which takes a pointed blank from the dies and carries it through a semi-circle into the heading position where the heading dies complete the work. The jaws still hold the nail until another quarter revolution of the carrier wheel has been made when the nail is automatically released and dropped. This wheel normally holds from three to four pointed blanks and is operated through a Geneva motion from the main crankshaft. The pointing and heading dies are readily accessible, it being possible to lift any one of them off in a few seconds for examination. Adjustable compensating wedges are provided to take up wear in all the important bearings and the adjustments for the anvil and dies are made in the same way.

In operation the wire is taken from the coil and fed through a set of straightening rolls mounted on the feed slide. An adjustable connection from the crankshaft operates the slide, which in the larger machines is provided with a quick return motion. In a single revolution of the machine the wire is fed forward to form the nail blank, which is cut off and the incoming end pointed at the same time. In the meantime a previously cut-off blank is being headed on the opposite side of the carrier wheel, which is then moved through a partial revolution, thus releasing a nail that has been previously headed.

Five sizes of machines are built for making nails from ¾ to 10 in. long from No. 17 wire to material that is ⅜ in. in diameter. The next to the smallest size of machine has an output of 400 nails 2½ in. long from No. 11 wire in 1 min. This machine occupies a floor space of 19 x 42 in. and weighs but 750 lb. The next size, which is the middle one of the series, occupies a floor space of 36 x 63 in. and weighs 2000 lb. This has an output of 350 nails 4 in. long from No. 6 wire per minute.

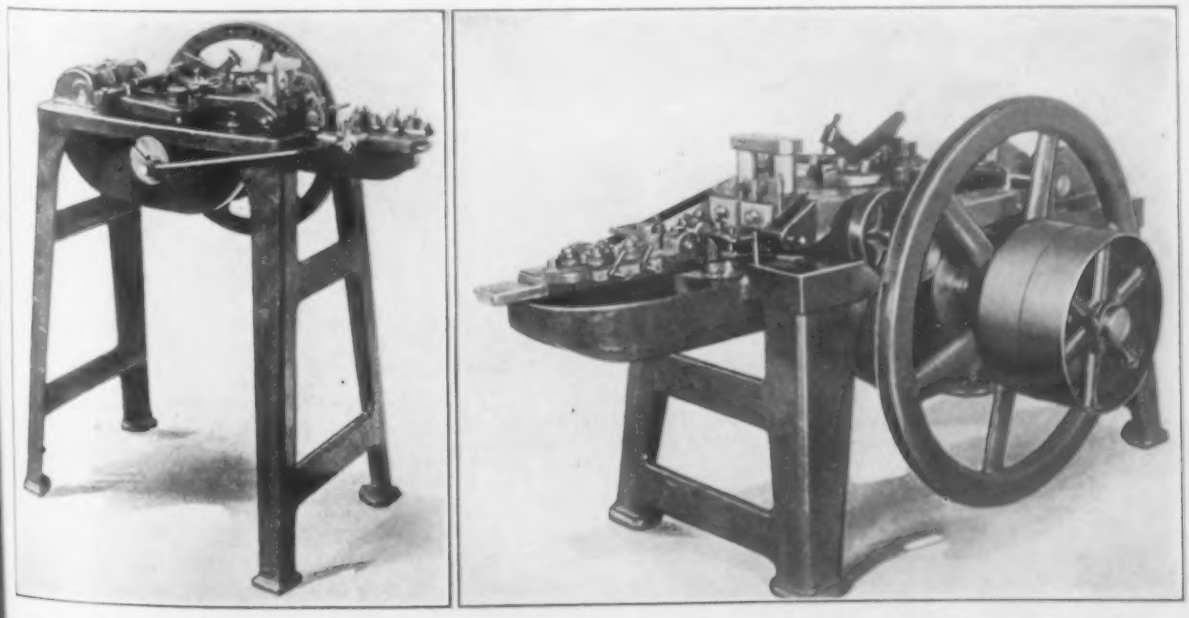


Toggle Joints Actuated from a Single Crankshaft Control All the Working Motions in a New Line of Wire Nail Machines

Great Northern Iron Ore Properties

The tenth annual report of the trustees of the Great Northern Iron Ore Properties for the period ended December 31, 1916, shows that the shipments of mines not leased amount to 617,287 tons, and from mines under lease to 1,215,776 tons. The net proceeds for the year amounted to $1,529,961. During the year the Warren mine was leased to the Mead Iron Company at a royalty of 15 per cent of the total ore mined. Butler Bros., at St. Paul, Minn., have leased the Smith mine at a royalty of $1.10 per ton, and a part of the North Uno mine at the same royalty. The Dunwoody mine has been leased to the Orwell Iron Company at a royalty of $1 per ton for ore mined from open pit, and $0.70 per ton for ore mined underground.

An unusual electric display has been added to the "Great White Way," Broadway, New York. It shows the emblem of the Rice Leaders of the World Association, composed of manufacturers banded together to stimulate an appreciation of sound business principles. Combined with the display of the emblem will appear the names and selling arguments of the L. S. Starrett Company, the Nicholson File Company, the Billings & Spencer Company and the Columbian Rope Company.



Nails Ranging from ¾ to 10 In. in Length Are Produced from No. 17 Wire and Intermediate Sizes Up to ⅜ In. in Diameter

Mayari and Nickel Steels Compared

Either Can Be Substituted for the Other so Far as Tensile Strength Is Concerned—Comparative Effects of Various Heat Treatments

BY S. W. PARKER*

THE experiments here described were made on ⅞-in. diameter rounds, 7 in. long, which had been rolled from 4 x 4-in. billets. The analyses of drillings taken from the billets were as follows:

	Carbon, Per Cent	Phosphorus, Per Cent	Manganese, Per Cent	Sulphur, Per Cent	Nickel, Per Cent	Chromium, Per Cent
Mayari steel billet =	0.370	0.014	0.54	0.035	1.18	0.57
Nickel steel billet =	0.330	0.029	0.57	0.027	3.48	0.17

Except for the percentages of nickel and chromium the analyses are practically the same, and are typical of these two kinds of steel of medium carbon content.

The Mayari steel is so called because made from Cuban ore from the province of Mayari, Cuba, the ore containing nickel and chromium forming a natural alloy, and persisting throughout the process of manufacture.

The Heat Treatment

One Mayari steel bar and one nickel-steel bar were heat treated together at the same time, both in quenching and drawing, so as to give them both exactly the same treatment. The heat treatment was done in an electric tubular-muffle furnace, the bars lying side by side with the end of a Le Chatelier pyrometer between them.

The bars were placed in the cold furnace, heated to 800 deg. C. in about two hours and held at that temperature for 30 minutes; they were then withdrawn and quenched cold in running water at about 10 deg. C.

In drawing, one pair of bars was placed in the cold furnace as before, heated uniformly to 350 deg. C., held at that temperature for 30 minutes, then removed from the furnace and allowed to cool in the air, being supported only at the ends to insure uniform cooling. The second pair was drawn at 400 deg. C. for 30 minutes, the third at 450 deg. C. and so on up to 750 deg. C.

The nine sets of bars were turned down to threaded tensile test pieces, having a diameter of 0.505 in., and tested in an Olsen testing machine. The elastic limits were determined with a "Cambridge" extensometer, using increments of load of 1000 lb. per sq. in. A short piece was cut from an end of each bar for microscopical examination and Brinell hardness testing. The results of these tests are shown graphically in Figs. 1 and 2.

The Microscopical Examination

The miscroscopical examination of the pieces from the threaded ends of these tests showed that, in the case of Mayari steel, free ferrite first appeared in the bar drawn at 650 deg. C., and increased in amount uniformly with the drawing temperature. In the case of the nickel steel, free ferrite was first visible in the bar drawn at 600 deg. C., and also increased uniformly with the drawing temperature. With both steels there appears to be a marked relation between the presence of free ferrite and the elastic ratio, the latter decreasing steadily with increase of ferrite.

After this examination the specimens were repolished and tested for hardness in four places on their cross sections, using a standard Brinell machine with a pressure of 3000 kilos and a 10-mm. ball. The hardness numbers given are the averages of the four readings.

Properties of Mayari and Nickel Steel Compared from Tests, Quenched in Water from 800 Deg. C. and Drawn at Various Temperatures

Mayari Steel		Nickel Steel
	Drawn at 350 Deg. C.:	
180,000	Elastic limit, lb. per sq. in.	168,500
213,000	Tensile strength, lb. per sq. in.	194,000
11.0	Elongation in 2 in., per cent.	13.0
40.1	Reduction of area, per cent.	51.4
S. ½ C.	Fracture	S. C.
430	Brinell hardness	402
84.0	Elastic ratio, per cent.	86.7
	Drawn at 400 Deg. C.:	
165,000	Elastic limit, lb. per sq. in.	156,000
195,000	Tensile strength, lb. per sq. in.	174,500
11.5	Elongation in 2 in., per cent.	14.0
44.6	Reduction of area, per cent.	53.6
S. C.	Fracture	S. ½ C.
387	Brinell hardness	369
84.5	Elastic ratio, per cent.	89.5
	Drawn at 450 Deg. C.:	
153,000	Elastic limit, lb. per sq. in.	145,000
175,500	Tensile strength, lb. per sq. in.	160,000
13.5	Elongation in 2 in., per cent.	15.0
50.3	Reduction of area, per cent.	54.7
S. C.	Fracture	S. C.
364	Brinell hardness	332
87.0	Elastic ratio, per cent.	90.5
	Drawn at 500 Deg. C.:	
137,000	Elastic limit, lb. per sq. in.	130,000
159,500	Tensile strength, lb. per sq. in.	145,500
16.0	Elongation in 2 in., per cent.	17.5
54.9	Reduction of area, per cent.	57.2
S. C.	Fracture	S. C.
332	Brinell hardness	302
86.0	Elastic ratio, per cent.	89.5
	Drawn at 550 Deg. C.:	
122,000	Elastic limit, lb. per sq. in.	117,000
140,000	Tensile strength, lb. per sq. in.	131,500
18.5	Elongation in 2 in., per cent.	20.5
62.3	Reduction of area, per cent.	59.9
S. ½ C.	Fracture	S. ½ C.
302	Brinell hardness	269
87.0	Elastic ratio, per cent.	89.0
	Drawn at 600 Deg. C.:	
112,000	Elastic limit, lb. per sq. in.	105,000
129,000	Tensile strength, lb. per sq. in.	119,500
21.0	Elongation in 2 in., per cent.	21.5
62.8	Reduction of area, per cent.	60.4
S. C.	Fracture	S. C.
269	Brinell hardness	241
87.0	Elastic ratio, per cent.	88.0
	Drawn at 650 Deg. C.:	
97,000	Elastic limit, lb. per sq. in.	84,000
115,000	Tensile strength, lb. per sq. in.	108,500
23.5	Elongation in 2 in., per cent.	24.5
64.3	Reduction of area, per cent.	64.0
S. C.	Fracture	S. C.
235	Brinell hardness	217
84.0	Elastic ratio, per cent.	77.4
	Drawn at 700 Deg. C.:	
71,000	Elastic limit, lb. per sq. in.	63,000
100,000	Tensile strength, lb. per sq. in.	99,500
27.5	Elongation in 2 in., per cent.	26.5
67.9	Reduction of area, per cent.	68.2
S. ½ C.	Fracture	S. C.
207	Brinell hardness	192
71.0	Elastic ratio, per cent.	63.2
	Drawn at 750 Deg. C.:	
60,000	Elastic limit, lb. per sq. in.	57,000
97,000	Tensile strength, lb. per sq. in.	99,000
26.0	Elongation in 2 in., per cent.	25.5
59.1	Reduction of area, per cent.	56.5
S. ½ C.	Fracture	S. ½ C.
179	Brinell hardness	170
61.7	Elastic ratio, per cent.	57.5

*Testing department, Bethlehem Steel Company, Steelton plant, Steelton, Pa.

Discussion of the Results

In Fig. 1 the physical properties are plotted against the drawing temperatures. The curves show that, when drawn at the same temperature,

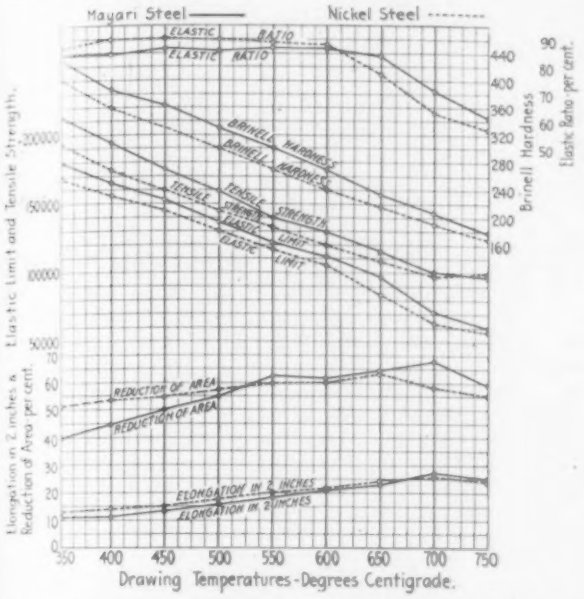


Fig. 1—Comparison of the Physical Properties of Nickel and Mayari Steels, Similarly Heat Treated, Quenched in Water from 800 Deg. C., Reheated to Temperatures Varying from 350 Deg. C. to 750 Deg. C. The physical properties are here plotted against the drawing temperatures

the Mayari steel has considerably greater hardness, tensile strength and elastic limit than the nickel steel, while the latter has slightly greater elastic ratio and elongation. Below a tensile strength of 150,000 lb. per sq. in. the Mayari steel has a greater reduction of area than the nickel steel. A high elastic ratio is a characteristic of nickel steels, both treated and untreated, and a large reduction of area is characteristic of tensile tests of steel having considerable percentages of chromium.

In Fig. 2 the physical properties and drawing temperatures are plotted against the percentage of

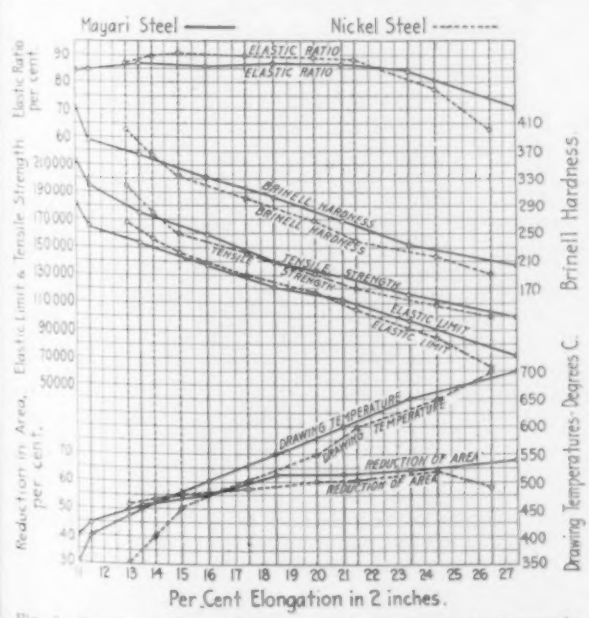


Fig. 2—Same as Fig. 1 Except that the Physical Properties and Drawing Temperatures Are Plotted Against the Percentage of Elongation in Two Inches

elongation in 2 in. The curves in the plate show that, when the two steels have the same elongation, the hardness, tensile strength and reduction of area of the Mayari steel are slightly greater, while the elastic limit and elastic ratio are slightly lower than the corresponding properties of the nickel steel. Below a tensile strength of about 120,000 lb. per sq. in., however, the elastic limit and elastic ratio of the Mayari steel are seen to be higher than in the case of the nickel steel.

The curves of the drawing temperatures in Fig. 2 show that in order to obtain the same elongation in these two kinds of steel it is necessary to draw the Mayari steel at a temperature about 50 deg. C. higher than the nickel steel.

It is interesting to note the close relation between the Brinell hardness and tensile strength of these tests—the curves are practically parallel.

On the whole, either of these steels could be substituted for the other, so far as the results of tensile tests are concerned. During several years of practical work it has been found that the above conclusions are broadly applicable to large heat-treated forgings of these two kinds of steel.

Directors of Society of Industrial Engineers

The board of directors of the Society of Industrial Engineers, chosen May 26, of which Charles Buxton Going is chairman pro tem., consists of the following:

Charles Buxton Going, New York; C. E. Knoeppel, industrial engineer and organization counsel, New York; Frank B. Gilbreth, industrial engineer, Providence, R. I.; E. C. Shaw, vice-president B. F. Goodrich Company, Akron, Ohio; Harrington Emerson, industrial engineer, New York; Charles Piez, president Link Belt Company, Chicago; Irving A. Berndt, manager betterment department, Joseph T. Ryerson & Son, Chicago; G. De A. Babcock, production manager H. H. Franklin Mfg. Company, Syracuse, N. Y.; Willard E. Hotchkiss, dean Northwestern University School of Commerce, Chicago; Harry Franklin Porter, Detroit Executives' Club, Detroit; H. Thorpe Kessler, president Western Efficiency Society, Chicago; Prof. Dexter S. Kimball, Cornell University, Ithaca, N. Y.; Morris L. Cooke, industrial engineer, Philadelphia; Charles Day, industrial engineer, Philadelphia; Herman Schneider, School of Engineering, University of Cincinnati.

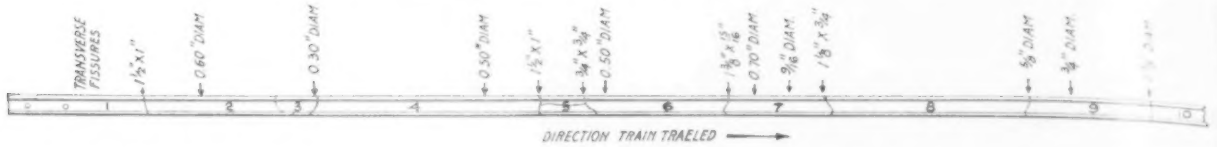
The society will be incorporated under the laws of the District of Columbia. Temporary headquarters have been established at 327 South La Salle Street, Chicago, in charge of G. C. Dent, temporary secretary. H. Thorpe Kessler is treasurer. The provisional president, Mr. Going, went to Washington early last week to make arrangements for a meeting June 15 of the newly elected board, when permanent organization will take place.

Suits for Slag Freight Charges

Formal suits growing out of the slag-disposal decision of the Interstate Commerce Commission have been filed in the Federal District Court at Cleveland by the Baltimore & Ohio, Pittsburgh & Lake Erie, Erie, Pennsylvania and New York Central lines against a number of iron and steel companies in eastern Ohio, claiming an aggregate of $149,338 on deferred freight charges. The companies named as defendants include: Youngstown Iron & Steel Company, A. M. Byers Company, Standard Slag Company, Ohio Iron & Metal Company, Struthers Furnace Company, McKeefrey Iron Company, Youngstown Sheet & Tube Company, and the Brier Hill Steel Company.

The Stamford Rolling Mills Company, Inc., Springdale, Conn., has decided to publish its own little monthly magazine, partly in the interest of its employees and partly for its customers. The first number contains an article on the improvements of a decade in rolling mill practice by William C. McGrath, assistant to the general manager of the company, and a brief exposition of the contest which is maintained among the men in the casting shop for prizes dependent upon production. To the magazine has been given the name "The Sheet of Brass," and the front cover, printed in a gold bronze ink, is intended to describe the title of the paper as well as one of the materials handled.

The Dimensions Show Areas and Mark Positions of Transverse Fissures, Both Those Noted at Time of Derailment and Those of Rupture Being Indicated, and Those Revealed in the Subsequent Examination



Rail Failure Attributed to Track Service

Transverse Fissures Are Fatigue Fractures, According to Report on Texas Accident—Experiments at Making Fissures at Will

ANOTHER contribution to the literature of rail failures resulting from transverse fissures, calculated to show that the fissures are the result of road conditions and not the outcome of rail manufacture, is a report to the Interstate Commerce Commission of the investigation of an accident which occurred on the Galveston, Harrisburg & San Antonio Railroad near Iser, Texas, Jan. 31, 1916. The investigation, which was made by James E. Howard, engineer-physicist of the commission, is discussed at length, with the aid of numerous illustrations, and forms practically all of the 46 pages of the report, which was transmitted to the commission by H. W. Belnap, chief of the division of safety of the commission. Copies of the publication may be obtained from the Superintendent of Documents, Government Printing Office, Washington, at 10 cents per copy.

The report not only analyzes in detail the conditions of the breakage of the rail, but covers experiments to show that transverse fissures may be made to order. In brief, Mr. Howard reiterates his contention that in service conditions it is not uncommon to find the fibers under considerable tension within the rail head and at the wearing surface initial compression, so that in the movement of loads and the establishing of maximum stresses a maximum fiber stress of tension is encountered in a central point in the head before the stresses at the surface of the head, more distant from the neutral axis, have sufficiently reversed the original compression stress to exceed the tension condition within the head. Out of this condition, he points out, the minute fracture occurs and from this develops the transverse fissure with the radial growth peculiar to it and regarded as establishing or defining the transverse fissure.

The initial break was about 2 ft. from the end of the rail. The opposite end was intact for a distance of 18 ft. 6 in., while the intermediate section of about 12 ft. 6 in. was broken into 8 principal pieces and 3 smaller ones, or a total for the entire rail of 11 pieces. The broken rail showed transverse fissures at each of the principal breaks, and the investigation clearly indicated that this accident was caused by a broken rail. It was an 80-lb. rail, A. S. C. E. section, made by the Tennessee Coal, Iron & Railroad Company, and laid in the track February, 1905, and it broke Jan. 31, 1916, its length of time in service, therefore, having been 11 years.

The leaving end, comprising about half the length of the rail, was torn from the ties and somewhat bent. In the subsequent examination of the rail 7 additional transverse fissures were revealed, making 15 in all. The fissures ranged in size from 0.3 in. in diameter to 1½ x 1 in. Thirteen were on the gage side of the head, or central over the web, and two were in the outer half of the head.

Three incipient fissures were revealed in the subsequent examination of the rail. The metal was planed off one side of the head, revealing the presence of these fissures. They appeared as fine vertical lines on the longitudinal section of the head. Favorable conditions are required for the detection of certain transverse fissures when viewed on edge. The opposite faces may be in such close contact as to obscure their presence either under a macroscopic or microscopic examination. One fissure was obscure at certain stages of the examination. A panoramic view, however, was obtained of this fissure, taken on edge, at 100 diameters magnification, the several sections of which furnished a continuous micrograph 4 ft. long in its magnified image. The fissure passed through the grains of the steel without any apparent tendency to follow their boundaries.

Growth of Fissure by Peening

The lower part of the fissure was the incipient portion. The microstructure of the rail in that part of its course or elsewhere did not show any abnormality which could be ascribed as a cause for the development of a transverse fissure in that vicinity. The piece of the head of the rail in which this fissure was located was planed down to cubical form, for convenience of handling at the microscope, measuring 1⅛ in. on a side, the fissure occupying a place on the middle of one face. This piece was broken into halves, by resorting to peening its top, the running surface of the rail. After peening the surface for a time there was a visible growth in the length of the fissure, which soon thereafter resulted in the complete separation of the cube. The action of the peening hammer assimilated to that of wheel loads in the cold rolling of the heads of rails in the track. By reason of the absence of bending stresses to cause burnishing of the opposite faces, the fracture was completed without further enlargement of the silvery oval.

The results of some special tests show that the position of the nucleus of a transverse fissure may be located at will in the middle of the width of the head, or on the right-hand or the left-hand side, according to the place where the load is applied. This control over the development of the transverse fissure in respect to position is confirmatory evidence of the explanation which has been offered in these reports that the cause of the formation of transverse fissures in rails pertains to track stresses and conditions of service.

Maximum Tension in Interior of Head

In addition to the usual strips, taken from the periphery of the head in the determination of initial strains, there were small rectangular bars taken from slices at the middle of the depth of the head. Strains of tension were found in the interior of the head, reaching a maximum of 6300 lb. per square inch. With metal at the top of the head in a state of compression and in the interior of the head in a state of tension, a favorable condition exists for the formation of an interior fracture under repeated wheel loads.

Neither the chemical analyses nor the microscopic examination showed any specific cause for the development of transverse fissures.

Accelerated Tests on a New Rail

The supplementary tests were made to determine the effects of wheel loads on the running surface of a new 100-lb. rail by subjecting different sections of its length to wheel loads of 35,000, 25,000 and 15,000 lb., respectively. Sections 5 ft. long each were subjected to wheel loads in a reciprocating machine, a chilled cast-iron wheel, 33 in. in diameter, being used for the purpose of applying the loads. The rail sections passed under

the loaded wheel with a reciprocating motion, a trip forward and back counting as one reciprocation. The number of reciprocations on each section and the wheel loads are shown on Fig. 2, which also shows the strains developed in the rail by this cold rolling and the stresses corresponding to the strains which were released when individual strips were detached from the rail.

By reason of the coning of the tread of the chilled iron wheel, only one edge of the top of the head was directly affected by contact with the wheel. The outer half of the head was but little affected when the loads were applied to the rail in one position only in the reciprocating machine.

Section F was reversed in position after 2000 reciprocations, and the opposite side of the rail then became the gage side, thus exposing both sides to the action of the chilled iron wheel. Section G was exposed to 2000 reciprocations on one side of the head, when reversed in position and loaded 2000 times on the other side, followed by an increase of the wheel load to 35,000 lb. on the second side. Reference lengths of 10 in. each were established on the head and base of each section prior to loading. The changes in the gaged lengths, due to the wheel loads, are shown on the diagram. Along the center of the top of the head the maximum strain was 0.0012 in.

These changes in lengths, measured on the intact section of the rail, do not stand in direct relation to the cessive stages and the strains displayed by the central core were measured at each stage. The cold-rolling strains in the sections from the reciprocating machine did not penetrate deeply into the metal of the head. Internal strains greater than those observed in these sections may be put into the rail by peening with a light hand hammer, but they also are superficial and do not penetrate deeply into the interior of the head. On the other hand, loads in the reciprocating machine, which were much greater than those here used, and wheel loads on rails in the track have shown effects penetrating to the center of the head.

Many of the phenomena attending the introduction of initial strains have not been investigated. The paradoxical effects apparently shown by the lower wheel pressures in introducing greater internal strains than higher wheel loads, and even reducing those of the lower loads, will probably be explained when more complete data shall have been acquired upon the volumes of the affected metal, the varying intensities of the internal strains in the affected zones and the influence which such disturbing conditions have upon the elastic limits of the steel in tension and in compression.

Little Microstructure Change from Gagging

Gagging will introduce internal strains, cause the rearrangement of pre-existing strains, and even locally efface severe cooling strains in certain parts of the

	A	B	C	D	E	F	G	H	I
WHEEL LOADS	0	35,000	25,000	15,000	0	15,000	15,000	25,000	0
NUMBER OF RECIPROCATIONS		2000	2000	2000		2000 & 2000	2000 & 2000	10,000	
STRAINS DEVELOPED, IN INTACT SECTIONS, BY RECIPROCATING MACHINE, HEAD, SIDES AND TOP.		+ 0.0003" + 0.0004" - 0.0002"	+ 0.0008" + 0.0005" + 0.0004"	+ 0.0003" + 0.0002" + 0.0001"		+ 0.0005" + 0.0012" + 0.0003"	+ 0.0006" + 0.0006" + 0.0006"	0.0009" + 0.0008"	
BASE, MIDDLE OF		- 0.0003"	0.0	+ 0.0001"		+ 0.0001"	+ 0.0001"	+ 0.0001"	
STRESSES IN TOP OF HEAD, MEASURED ON PARTS OF SECTIONS EXPOSED TO WHEEL LOADS.		6000c	9900c	16500c		14,100 c 15,900 c	15000c 9000c	-12600c	

A New 100-Lb. A. R. A. Type B Rail Was Subjected in Sections to Different Pressures in a Reciprocating Machine with the Results Here Noted

internal strains which were introduced by the wheel loads. There is a certain response in the metal to the strains which are being introduced by the wheel loads, but this response is the resultant effect of the strains which are in the metal at the running surface of the head, and those strains which represent the reaction of contiguous metal next below. Differences in the respective volumes of metal directly affected, and the volume of contiguous parts, will modify the results.

Each of the wheel loads employed introduced initial strains on the gage side of the head, and it was further shown that the internal strains in the sections rolled with 15,000-lb. wheel load were greater than those of the higher wheel loads. Still further, it appeared that the highest wheel load employed had the effect of reducing the initial strains which were introduced by the lowest wheel load. This result appears in the test of section G, which was rolled on each edge with 15,000 lb., followed by a load of 35,000 lb. on the second edge. The effect of 10,000 reciprocations at 25,000 lb. on section H was greater than that due to 2000 reciprocations of the same load in section C.

The maximum value reached in these stresses was 15,900 lb. per square inch, a high value, but one which has been exceeded by rails in the track. The internal strains which were found in the metal on the gage sides of the rail were so much above those found in the outer side of the head, which latter were almost negligible, and also so much above those which were present in the companion 1-ft. lengths not cold rolled, as to leave no doubts concerning the augmentation of internal strains in the top of the rail by wheel pressures.

In order to acquire data upon the depth of penetration of the effects of the wheel loads on the rail sections from the reciprocating machine, sections of the head were examined adjacent to those on which the initial strains in the strips were measured. The heads from these adjacent sections were turned down in succession—such action not eliminating the internal strains as a whole, but shifting their positions—nevertheless it does not follow that gagging will cause a perceptible change in the microstructure of the steel. A series of observations were made upon 100-lb. rails of two grades of steel, a high-carbon and a low-carbon series, touching upon this feature. The rails were subjected to mechanical treatment of normal and excessive gagging and 10-ft. drop tests on head and base.

Cross sections of these rails after treatment were examined with reference to the microstructure of the head in the region where transverse fissures have their origins. The sections were also tested to ascertain whether the physical properties of the rail were affected in an appreciable manner by the normal and excessive gagging on the head or on the base; or whether an accentuation of gagging pressures, such as experienced by the rail in the drop tests, affected the strength of the steel.

The metal at the immediate surface of the head is shown by photomicrographs to be decarburized in each series, most noticeably in the low-carbon series. Concerning the metal at the interior of the head, in the region of transverse fissures or elsewhere, no peculiarities of structure were found indicative of the effects of gagging or the drop tests which had been given, either on the head or on the base. In other words, neither the gagging in normal or excessive amount on the head or base nor the more severe ordeal of the drop test had appreciably affected the microstructure, these remarks applying to each grade of steel.

Gagging may, however, be conducted after the manner of fatigue tests and ultimately cause the rupture of the rail. In order to do this a large number of repetitions are necessary. To produce an interior fissure by means of repeated gagging it has been found necessary to apply the gag progressively over the entire length of the rail, bending it alternately convex and

concave, and repeating this operation for a considerable number of times. When the gagging is confined to one place, applied alternately on the head and the base, the common type of fatigue fracture of exterior origin results.

By means of progressive gagging interior transverse fissures have been developed in 24 new rails. The task of making these fractures was rather colossal. Half-rail lengths were used for convenience, the number of blows upon which in the aggregate amounted to nearly one and one-half millions. Each blow of the gag caused a permanent set in the rail. The number of blows delivered at any one point on a rail ranged from 800 to 4000. During the progress of gagging the stroke of the press was increased from time to time over the original amount in order to compensate for the changes in resilience which resulted from repeated reversals of loads. A decided permanent set was given the rail by each blow and maintained throughout the test.

Central, vertical loading produced a transverse fissure in the middle of the width of the head. By inclining the rail and applying the load on one side of the head, a transverse fissure was produced on the side of the head which was loaded, and on either the right or the left side of the head, according to the side on which the load was applied.

No Fissures on Outside of Head

In a group of 663 rails, which displayed transverse fissures, a large preponderance of the fractures (535) were on the gage side of the head, a less number (128) were centrally located, and none were on the outside of the head. These fissures were in rails of different chemical composition, of different weights of sections, of Bessemer and open-hearth steel, and failed after different periods of time in service.

Fatigue and Transverse Fissure Fractures

Still further information was acquired upon the microstructure of the rail causing the derailment at an incipient transverse fissure, one which showed the opposite faces of the fissure to be in close proximity to each other, and here illustrated. The location of the fissure having been predetermined, the specimen was polished and etched with picric acid. No trace of the transverse fissure appeared on the etched surface, as indicated by photomicrograph 10-A. The metal was repolished, removing the structural shapes which the picric acid had brought into view, the fissure still remaining unrevealed, as indicated by photomicrograph 10-B.

The specimen was then treated with a boiling solution of ammonium oxalate, which brought into view the transverse fissure, as shown by photomicrograph 11-A. The location of the fissure remained visible when again repolished, as shown by 11-B.

There is a zone for each grade of steel within which loads may be repeated without rupture, practically for an indefinite number of times. When loads exceed this zone all grades of steel are soon ruptured. From the period of successfully enduring loads, which may be repeated hundreds of millions of times, the endurance of the steel suddenly drops to a few thousand or hundred thousand repetitions. Herein is recognized a danger zone, on one side of which steel has nearly unlimited life, on the other side of which early failure will take place.

Two grades of steel have been selected for illustrating their endurance in laboratory tests, the results of which are shown on figure No. 26. Steel of 0.55 per cent carbon content endured 76,000,000 repetitions of 30,000 lb. per square inch, alternate tension and compression, without rupture. The load was increased 5000 lb. per square inch, on a companion bar, whereupon rupture ensued at 900,720 repetitions. The fracture of a third bar, tested under an additional increment of load of 5000 lb. per square inch was reached at 455,350 repetitions. Similar results were shown by the 0.82 per cent carbon steel.

Microstructure of a Longitudinal Section, at an Incipient Transverse Fissure, of the Rail Which Caused the Derailment. 10 A, area containing transverse fissure, but not revealed by polishing and etching with picric acid. 10 B, same area repolished. 11 A, same area treated with ammonium oxalate, revealing the presence of the transverse fissure. 11 B, same area repolished after treatment with ammonium oxalate. Magnification, 100 diameters, and not reduced from cuts of report

From the small number of tests which have been made on full-sized rails, the results of two will be presented, furnishing examples of rupture by repeated, alternate, bending loads, none of which caused appreciable permanent sets. These tests were made in a vibratory machine on rails which had been in service in the track. Their composition and physical properties are shown in the table.

Rails Fractured by Repeated, Alternate Bending in Vibratory Machine. Tests of 90-Lb. Rails Taken from the Track

	1	2
Rolled	9–1911	5–1912
Ingot position	..	C.
Number of vibrations causing rupture	145,086	289,557
Elastic limit	75,360	86,800
Tensile strength	118,400	138,500
Elongation, per cent	16.0	11.0
Contraction of area, per cent	25.6	16.2

Fatigue fractures developed in both cases, No. 1 in the head, 60 per cent crystalline, and No. 2 in the base and crystalline.

The development of a transverse fissure presents a type of failure which has the characteristics of a fatigue fracture. A fatigue fracture is gradual in its development chiefly when the loads which cause it are variable. It is a tension fracture, and occurs where the tensile stresses reach a maximum.

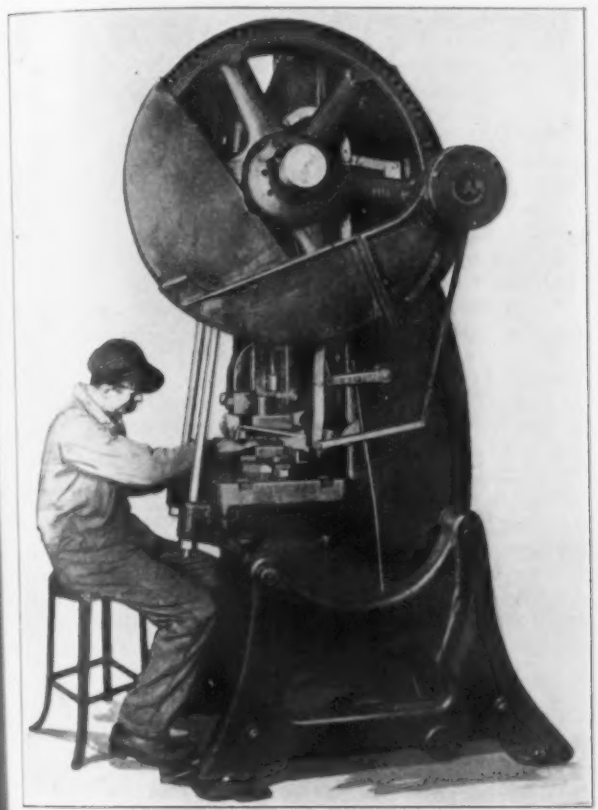
Neither chemical analyses nor microscopic examinations have shown a definite cause for the development of transverse fissures. Traffic has increased, wheel loads have increased, and speeds have increased; and transverse fissures are in general found where these conditions are well advanced. The girder strength of the rails has been increased, while the impinging pressures of the wheels still remain without amelioration. It is a disquieting matter that rails of the heavier sections recently laid have displayed transverse fissures. Mere increase in weight of section has not brought with it immunity from failure in this manner. It gives emphasis to the need of acquiring further data upon the features which have been discussed in this report.

The conclusion seems well founded that transverse fissures are fatigue fractures, and that they develop in rails which are structurally and chemically free from any known defect. It is a modified type of fatigue fracture in which there is a compressive component in the rail next the running surface of the head. The presence of this compressive component accounts for the

interior origin of the transverse fissure. It constitutes the difference which the introduction of the term "transverse fissure" was intended to emphasize over the common type of fatigue fracture in which this component is absent and which in consequence thereof has an exterior origin.

New Guard for Punch Presses

A guard for punch presses that is entirely independent of the treadle has been placed on the market by the G. H. Scott Machine Company, Cleveland. Ac-



A Guard for Punch Presses That Is Actuated by a Cam and Roller and Is Entirely Independent of the Treadle

cidents due to repetition of the press are said to be impossible and in addition interference with production is avoided, as well as accidents to the dies and the press itself.

The guard is actuated by a cam and roller and descends ahead of the ram, the work being visible at all times and the operator having free use of his hands. It is explained that if any obstruction such as a hand, wrench or other tool is in the path of the guard and prevents it from reaching the lowest point to which it has been adjusted, the ram will stop until this is removed.

Fine Displays of Flags

An unusual display of flags has been made in the plant of the Scoville Mfg. Company, Waterbury, Conn., where, it is stated, within 24 hr. after news of the declaration of war against Germany the employees of the company, on their own initiative, had decorated desks, benches, posts, walls and machinery with flags. In one of the buildings where there are long rows of vertical presses, the colors were arranged so that they moved up and down with the motion of the presses.

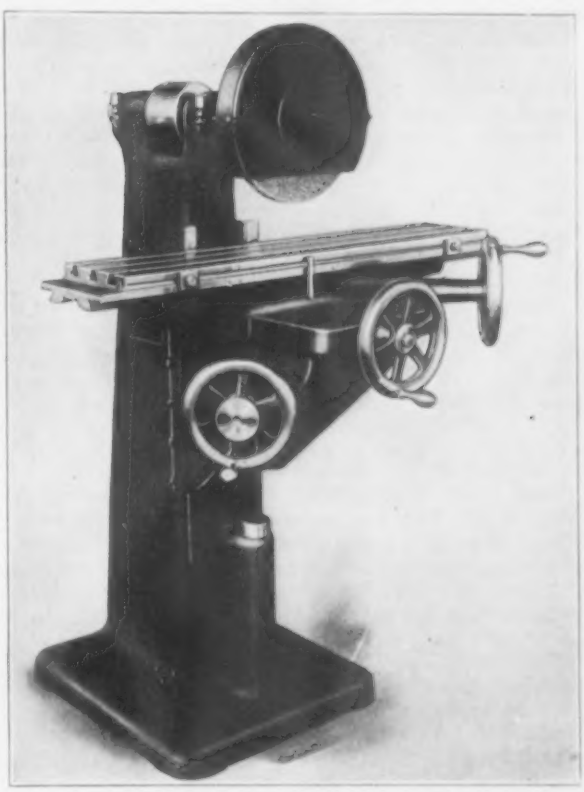
The Kempsmith Mfg. Company, Milwaukee, Wis., maker of milling machines, devoted the morning of Memorial Day, May 30, to dedicatory exercises of a new 60-ft. steel flagpole, made in its own shops, from which a huge American flag, presented by the force of employees, was unfurled with due ceremony. A program of speeches, military band music and mass singing of patriotic songs was followed by a public reception in the plant. The flag was raised by a squad of well-drilled apprentices, who also gave the regulation flag salute as the banner broke out at the top.

Horizontal Surface Grinding Machine

A horizontal spindle surface grinding machine employing a narrow-face wheel has been brought out by the Manhattan Machine & Tool Works, Grand Rapids, Mich. The movements of the knee and the table are controlled by handwheels, all of which are grouped for convenient operation. It is possible to use any make of dividing head on the machine, as well as surfacing the bed and the table with the wheel.

The machine is intended for heavy-duty work. In the design an effort has been made to eliminate vibration and to cover the bearings and guard them against the entrance of dust and grit. The knee is raised and lowered by a screw operated by a handwheel having a dial graduated to read to 0.001 in. and a lock nut is provided for holding the knee at the desired height. The bed is 48 in. long over all, the working surface measuring 7½ x 36 in. Three ⅝-in. T-slots are provided for clamping work or fixtures. A rack and a spiral pinion also controlled by a handwheel regulate the travel of the bed, two adjustable stops being provided to limit the movement.

The machine uses a wheel 12 in. in diameter with a 1-in. face, the diameter of the hole through the center being 1⅝ in. The spindle is driven by a pulley 5 in. in diameter with a 3½-in. face. The spindle bearing is 1½ in. in diameter and of the split brass type with provision for self-lubrication from a large reservoir.



Handwheels for Controlling the Various Movements of the Knee and Table Are Grouped for Convenient Operation

The center of the spindle is 48 in. from the floor and the maximum distance from the wheel, which overhangs 8 in. from the column, to the bed is 13½ in. The weight of the machine is 860 lb.

The Wharton Steel Company, Wharton, N. J., has blown in Furnace No. 3, with capacity of 500 tons, May 25, making the second unit to be placed in operation since the reopening of the works, Furnace No. 1, with capacity of 125 tons, having been blown in on April 12. It is planned to operate Furnace No. 2, now being remodeled and improved, about June 15, with total capacity of 500 tons.

The West Virginia Oil & Gas Company has increased the price of gas to domestic consumers in the Columbiana, Ohio, district from 30c. to 36c. per 1000 cu. ft.

Preparing to Rush War Legislation

Hope That Congress May Be Able to Adjourn by July 15—Union Labor Causing Trouble by Exorbitant Demands—Cause of the Mongolia Accident

WASHINGTON, June 5, 1917.—Realizing somewhat tardily that war preparations are lagging because of the failure of Congress to promptly enact necessary legislation, the leaders of both houses are now planning a "summer drive" designed to put through the entire war legislative program and bring about a final adjournment of Congress by July 15. When the special session convened on April 2, it was predicted an adjournment would be taken by May 15. Expansion of the legislative program has been partly responsible for the delay, but partisan bickering and hairsplitting discussion of non-essentials have been chiefly instrumental in extending the session. More rapid progress in both houses is now promised, especially with bills carrying appropriations for the prosecution of the war.

The big war budget bill which, as amended by the Senate, will carry nearly $3,500,000,000, is now emerging from Conference Committee and every effort will be made by the Congressional leaders to send it to the President for his signature before the end of the week. The conferees have held this important measure for nearly a fortnight, much of the time being devoted to the discussion of the provisions clothing the President with authority to commandeer shipyards, factories, and all material available for use in the execution of the Shipping Board's project for building the big fleet of cargo vessels. The conferees will probably adopt the House provision, heretofore outlined in THE IRON AGE, and have already agreed upon an appropriation of $405,000,000 for construction purposes. A supplemental authorization of $350,000,000 will also be carried by the bill, but the actual appropriation of this amount will be deferred until next December, Congress preferring to supply funds for what is regarded as more or less of an experiment only as fast as they are actually needed.

Working in Harmony Now

Chairman Denman, of the Shipping Board, and General Goethals, manager of the Emergency Fleet Corporation, are now working in apparent harmony. The principal result of the recent acrimonious exchange of views by these officials concerning the policy of the Shipping Board has been to emphasize the importance as well as the feasibility of the construction of steel cargo vessels and to minimize the value of wooden ships. It has also served to demonstrate to the country that the success of the entire project of the Emergency Fleet Corporation rests upon the ability and the hearty co-operation of the leaders in the iron and steel industry. It is highly significant that even in Congress, where it is the fashion to assail these men on every possible occasion, there is a strong feeling of confidence that the United States will frustrate Germany's submarine plans through the assistance of the steel industry volunteered at a time when the Shipping Board's project was about to collapse.

Strong endorsement of General Goethals' plan to build the greater part of the cargo fleet of steel comes from Bernard M. Baker, of Baltimore, who ranks among the foremost American authorities on shipping problems and who was originally appointed a member of the Shipping Board but resigned because of Secretary McAdoo's interference with the board's plan to select its own chairman. Mr. Baker, in an interview says that "the entire wooden ship proposition is a fantasy of misconceived ideas, a midsummer night's dream." Every dollar spent in wooden ships, he declares, is a dollar thrown away, and he adds: "Let General Goethals alone and he will build the United States a real merchant fleet."

International Purchasing

The signing by the President of the big war budget bill will soon be followed by the publication of the international agreement creating a purchasing commission to buy war supplies for the United States and the Entente Allies. It is the hope of the officials engaged in drafting this agreement to avoid the necessity of submitting it to the Senate as a formal treaty, but there is no question that after it has received the signature of the diplomatic representatives here of the Allies it will be necessary to procure authority from Congress for the creation of the commission and for the transfer to the new body of the authority now vested in numerous governmental purchasing agencies.

An effort is being made to extend the spirit if not the letter of the proposed agreement as to the purchase of war supplies so as to cover all material that may be bought by the railroads during the war. With this object in view, Representative Park, of Georgia, has introduced a bill embodying an amendment to the interstate commerce law making it unlawful for any common carrier, either directly or indirectly, to pay for supplies or material used thereby, any sum "in excess of the unit prices applicable on June 30, 1916, on such article or articles of the same or similar kind, quality and quantity." It is provided, however, that whenever any dispute or controversy shall arise respecting delivery or the price to be paid for any article, "the same shall be determined by the President, who is authorized to direct that delivery be made at such price as he shall determine, after full hearing, to be reasonable."

The Council of National Defense announces the appointment of a committee on construction contracts to serve in an advisory capacity to the general munitions board. It consists of C. M. Lundoff, chairman; W. A. Starrett, M. C. Tuttle and J. B. Talmadge, secretary. This committee will be permanently located in Washington.

The Embargo Provision

The conference committee having under consideration the so-called espionage bill which has been delayed because of the controversy over the censorship provision embodied therein, has reached a substantial agreement on all the leading features of the measure, including the section clothing the President with authority to direct exports and impose embargoes under certain conditions. The censorship section has been stricken out and the fight for its adoption has been abandoned by Administration officials. The embargo provision, which is recognized as one of the most important features of this measure, provides that whenever during the present war the President shall find that the public safety shall so require, and shall make proclamation thereof, it shall be unlawful to export from or ship from or take out of the United States to any country named in such proclamation any article mentioned, except at such time and under such regulations as the President shall prescribe.

A prize of $1,000,000 to the person inventing a device for the destruction of the submarine and a similar reward for the invention or discovery of any method of locating submerged submarines, to be used on ships, are proposed in a bill introduced in the House by Representative Emerson, of Ohio.

Daylight saving as a war measure is strongly urged in a report which has just been made by the Senate Committee on Interstate Commerce upon Senator Calder's bill providing for a nation-wide advance of all clocks one hour on the last Sunday in April of each year and a return to normal astronomical time on the

last Sunday in September. Data submitted by the committee indicate that where the daylight saving plan has been tested in manufacturing establishments there has been an important increase in output, a marked diminution in the number of accidents, and a substantial economy in the expenditure for artificial light. The health of operatives is said to have shown marked improvement, which is attributed to the fact that the last hour of the usual working day in hot weather is devoted to outdoor work or recreation rather than to labor.

The Commission on Navy Yards and Naval Stations has recommended to the Navy Department the selection and development of submarine and aviation bases on the Pacific Coast, and Secretary Daniels has submitted to Congress an estimate for an appropriation of $7,455,000 to carry out the project.

Trouble With Union Labor

The Naval Department is facing a difficult problem in the attitude of union labor toward the project for providing double and triple shifts of workmen to speed up naval construction. The first step taken by the Department after the President's proclamation suspending the eight-hour law was issued authorized a lengthened day with time and a half for the extra hours, and when the union leaders objected to this arrangement, plans were made to expedite the work by putting on two or even three shifts in the emergency branches. The men then demanded that every additional and independent shift after the regular day force should be paid double time. In view of the high rates now being paid by the Government for skilled labor, in accordance with the standing regulations under which the scale at the navy yards must closely approximate that paid by private establishments in the vicinity, there is already a prospect that practically all the work done in the yards will exceed the estimates. To accede to the demands of the union leaders would enormously increase construction costs and the officials of the Navy Department are making every effort to induce the workmen to take a more reasonable view of the matter.

Real Cause of the Accident

The adoption by the Senate of a resolution to investigate the extraordinary accident by which two nurses were killed on the armed merchant ship Mongolia by a piece of the cap of a shell cartridge which, when fired at a target, rebounded aboard the ship, has already resulted in the development of facts which may have an important bearing upon the method of manufacturing ammunition for six-inch naval guns. In a preliminary report made to the department immediately after the accident naval experts suggested that the mishap was due to the fact that a shell made prior to 1900 was used, such projectiles having thinner walls than those provided in shells of the latest type. Further investigation completely discredits this theory. It now appears that the accident was caused by fragments of the brass cup which is placed in the mouth of the cartridge case holding the powder and which is inserted in the chamber of the gun behind the shell. The brass cup broke into fragments when the gun was fired and these fragments were carried outside the gun, apparently maintaining a rotary motion due to the rifling. Naval authorities declare that no blame whatever attaches to the manufacturers of these shells as they were made in conformity with long standing specifications. The defect is entirely in the design and the Ordnance Bureau will now give very serious consideration to the question of a modification calculated to prevent similar accidents in the future.

W. L. C.

The Acme Supply Company, Chicago, brass and bronze castings, changed its corporate name on June 1 to the Dunbar Mfg. Company. The general offices of the company are at 5133 West Lake Street, and sales representatives are located in Chicago, New York, Richmond, St. Paul, Portland, Ore., San Francisco and Los Angeles. The officers are Thomas Dunbar, president; H. U. Morton, vice-president and treasurer, and T. K. Dunbar, secretary.

WILL CONSIDER WAGE SCALE

Meeting at Atlantic City Will Discuss Proposed Increase—News of Labor World

The conference which will begin at Atlantic City, N. J., Monday, June 18, between sheet and tin plate mill wage committees of the Amalgamated Association and manufacturers of sheets and tin plate on the proposed new Amalgamated wage scale for sheet and tin mills, effective for the year beginning July 1, may be somewhat extended. No changes were made in the base rates in the sheet and tin mill scales, but important changes were made in the foot notes in both scales, and it is possible that the adjustment of these may require considerable time. Also at Atlantic City on June 25, a conference between the bar iron committee of the Amalgamated Association and the bar iron makers in the Central West will be held. The Amalgamated scale for bar iron mills for the year starting July 1 provides for an increase of 50c. per ton for boiling, up to a 1.30c. bar iron card, 15c. on a 1.30c. card, 10c. on a 1.35c. card, and 5c. per ton on a 1.40c. card. No advances are made after the price of bar iron passes 1.40c. It is said several manufacturers have expressed themselves as being opposed to the advance of 50c. per ton in boiling, and will combat it at the conference.

Westinghouse Grants Another Increase

The Westinghouse Electric & Mfg. Company has announced the granting to its employees another advance in wages, effective May 16, amounting to 10 per cent. This will affect all of the workmen in the shops and all of the office force, except a few of the higher salaried employees. This is one more of a number of raises in wages granted to the workmen in the shops, which raises represent a general increase, in a period of two years, of about 40 per cent. The company has never made a practice of granting horizontal raises to the entire force, but has pursued the policy of granting the increase according to individual merit, but the gradual increase in the cost of living has caused a modification of policy. The Westinghouse company has also subscribed for a number of Liberty bonds which it offers to its employees, permitting them to pay for same in small monthly or semi-monthly installments. The management has laid out a comprehensive plan for handling subscriptions, making it exceedingly easy for any employee to subscribe, and the advance in wages mentioned above will also serve to add to the facility with which these subscriptions may be made by the employees. The officers of the company say that the response to the subscriptions for the bonds has been exceedingly gratifying.

Wage Advances

The A. M. Byers Company, Columbia, Pa., manufacturer of pipe, has advanced the wages of puddlers at its local works from $9.25 to $9.75 per ton.

The Carpenter Steel Company, Exeter Street, Reading, Pa., has increased the wages of employees from 5 to 12 per cent, effective June 1, in addition to a bonus of 10 per cent for full attendance. About 2000 hands are affected.

The Reading Iron Company, Reading, Pa., has inaugurated a new scale of wages for puddlers, advancing the rate from $9.25 to $9.75 per ton.

The Bethlehem Steel Company has commenced a registration of employees at its Harrisburg, Pa., works, to assist in the national enrollment. The work is being conducted mainly among foreigners and negroes.

The first unit of the works which the Electrolytic Zinc Company of Australasia Proprietary, Ltd., is to erect at Risdon, Australia, has been started and is expected to be in operation by Aug. 31, 1917. The first of the output is to go to the British Government and the company, with a capital of nearly $5,000,000, is under contract for electric power from the Tasmanian Government.

The American Rolling Mill Company, Middletown, Ohio, has subscribed for $500,000 of Liberty bonds.

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THE IRON AGE

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Problems of Steel Consumers

It is of some importance to weigh the factors in the steel situation affecting further purchases of shell steel by the Allies. The last great purchases covering the major needs of the last half of 1917 were made in competition with buying for peaceful pursuits and eight or nine months in advance of the beginning of deliveries. If the United States were not now on the side of the Allies, it is probable that an additional million or more tons of shell steel would have been booked two or three months ago. Instead nothing is now heard of covering for the raw material to be shipped across the Atlantic in the coming year. Clearly little concern is shown, if any at all, over getting the material when needed, now that the United States Government is virtually a buyer for the Allies. England's increasing steel production can hardly yet make her self sufficient, particularly with more intensive artillery firing in France.

With the war steel demands of the United States gradually mounting, and with signs that the rate at which raw material will be taken from this country for France and England will be fully as large as ever, the outlook of the domestic steel consumer not engaged on direct war contracts does not brighten. He can look forward to aggravating experiences of delay in getting materials. After facing the increased prices for materials with a diminishing supply of labor and increasingly inefficient labor at that, and after the embarrassments of embargoes on materials coming to him and on product going out of his works, he has now been suffering for some time from a further diminution in the supply of materials, both from the overloaded order books of producers and the inadequacy of transportation. With the material question thus chaotic, he sees in the not distant future a further cutting down of the supply of workers through the draft for the army.

As decidedly increased activity is to be expected in metal working lines as the war progresses, measures need to be taken to mobilize labor supply not yet drawn upon, meanwhile keeping a close watch of the raw material market. Europe's experience makes it certain that more women will enter into industry than ever before. It follows that manufacturing methods must be changed to make the best use of this new labor. Some manufacturers have already been canvassing the situation with regard to female labor. In some sections of the country there seems to be no difficulty about the immediate future in this regard, while in others it is not clear where the supply is to be obtained. Thus far, the future has been allowed to take care of itself, but fore-handed manufacturers will keep the subject constantly in mind. With the necessity of maintaining a balance between the labor employed and the material on which to keep it at work, demand remaining insistent, plant managers have ahead of them many months of close application and of peculiarly trying problems.

A Just Basis for War Buying

Two effective expressions of a thing very important for Congressmen and all in authority at Washington to remember have been made in the recent discussion of war economics. One is found in the question a steel manufacturer asks, and which he makes the text of a leaflet dealing with the suggestion that the Government secure its steel for war purposes at prices much below those currently paid by consumers: "Can the Federal Government eat its cake and have it?" In other words, can the Government collect large war taxes from manufacturers who are buying raw materials and labor at the highest prices ever known unless, in buying their product, it pays them prices in line with such costs? The force of this putting of the case is doubled when it is seen in the light of the plans to buy steel for the Allied Governments on the same basis, as well as the plans to give them billions in credits at the same rate of interest at which the Federal Government is raising the money on a tax-free obligation.

The second of the two forceful puttings of the idea conveyed above is found in the speech of Frank A. Vanderlip, president of the National City Bank, New York, at the conference of editors of business papers at Washington, May 25:

"It has been in some people's minds—I think it is pretty well dissipated now—that the Government could spend the same amount of money three times: first, by buying for less than a thing was worth—buying below the market; second, by taxing away all the profits, if there were any profits left; and third, by getting us to subscribe for bond issues. You cannot do that. You have got to have

prosperous business if we are going to have the power of accumulation to furnish the finances to fight this war."

It is reassuring that the Senate Finance Committee's work, as it progresses, shows that the second thinking on the problems of the war budget has been sounder than the first. It is to be hoped that a like improvement will be found in the sober second official thought as to the basis of war buying of steel.

Rail Failures by Fatigue

Another comprehensive contribution on transverse fissures in rails is reviewed in this issue. It covers an investigation growing out of a derailment in Texas caused by a broken rail. In the single length of rail no less than fifteen transverse fissures were discovered, although some of these were of an incipient character located in the course of the examination.

The view taken in the report is that the transverse fissures are, after all, merely fatigue fractures, and in so holding Mr. Howard, the engineer-physicist of the Interstate Commerce Commission, adheres to his earlier contention. His theory is that the cold rolling of the surface of the rail, resulting from the moving of wheel loads, puts the metal at this maximum distance from the neutral axis in a state of initial compression, so that maximum tensile strains are developed in the interior of the head of the rail before the compression in the top has been reversed sufficiently for a tension fracture to occur at the wearing surfaces. In other words, he contends that the compression at the top of the rail is so great that the interior elements always remain in the ascendancy as regards tension.

Considerable emphasis is placed on his proof that transverse fissures admit of being made at will and may be either central or at either side of the rail according to the manner of loading. Where fissures have been located on the outside of the head—that is, not on the gage side of the rail—it is asserted that these points have been exposed to the loading of wheels whose contours put the pressure on the outer portion. In support of this view mention is made of 663 transverse fissures, none of which were on the outside of the head. One exception noted was the particular rail which caused the accident; two fissures were noted toward the outside, but it is stated that the effects of wheel pressures were visible so that the condition of weakness is considered as decidedly fitting into the general argument.

Mr. Howard claims that no effects of gagging have been detected in the interior of the head, and that even the severe treatment of the drop test has not shown a visible effect either macroscopically or microscopically. Transverse fissures, he points out, develop in rails which show practically no wear, and fatigue fractures in the laboratory are formed without indication of wear. Rails from reheated blooms, he adds, have shown transverse fissures at an early stage in their life in the track.

Attention is called in the report to the limit of endurance to repeated alternate stresses. Under a load of 35,000 pounds per square inch a grade of steel withstood 947 times as many repeated stresses as when loaded to 45,000 pounds and two and one-half times as many repetitions as when it was loaded to 40,000 pounds. The burden of the report is that little attention appears to be given to the life of a steel rail in terms of the fiber stresses involved and the number of repetitions of loading. To prove or disprove Mr. Howard's contention, it seems desirable to continue observations of the stresses of rails in tracks, and thus dispose once and for all of the consideration of this problem from the mechanical or physical standpoint, especially when so much is charged up by the railroads to the chemical and metallurgical influences.

Ship Plate Rolling Capacity

Owing to the high degree of specialization to which the designing of rolling mills has been brought, a great deal of misapprehension arises among the uninitiated as to the dislocation that may be caused in the steel trade by the placing of Government orders for steel products. The strain is not nearly so much upon the steel industry as a whole as it is upon certain precisely defined branches. At this time, it is indeed very unfortunate that they are so precisely defined.

How rigid the limitation may be is brought out by examination of the 1916 production statistics just made public. Every one knows that if there is a finished steel product that has been in especially heavy demand it is plates for shipbuilding. In 1916, plate prices drew entirely away from shape prices, with which they had been in all the past closely associated. Yet the bare statistical fact is that while the production of all rolled iron and steel increased from 1913, the year before the war, to 1916 by 30.6 per cent, the production of sheared plates, ¼-inch and heavier, increased by 30.3 per cent, or not as much. The phenomenal demand could not swell the sheared plate production one iota beyond its former proportion of the total output of rolled material.

According to the official classification there was 587,508 tons of material under ¼ inch thick rolled by sheared plate mills in 1916, while there was rolled by jobbing mills 271,809 tons of material No. 12 gage and heavier. As No. 12 gage is 7/64 inch thick, the plate and sheet tonnages doubtless overlap, and there are certain orders that go to light plate mills or to jobbing mills, according to which quotes the lower price. The total output of the plate mills in 1916 was 3,677,384 tons, but the definition of this material is by method of manufacture rather than by thickness. If the jobbing mill output of 12 gage and heavier be added, we have a total that is limited by thickness rather than by mode of manufacture. This output increased from 3,255,107 tons in 1913 to 3,949,193 tons in 1916, or by 21.3 per cent. The output of heavier than ¼-inch increased by 19.2 per cent, while the lighter material increased by 28.0 per cent. The output of heavy sheared increased 30.3 per cent and the output of heavy universal 5.5 per cent.

For ship purposes deductions must be made from the total plate output, which was 3,949,193

tons in 1916. First one must deduct the 12-gage and heavier made on jobbing mills, 271,809 tons. Then there must be deducted the 587,508 tons of sheared plates, under ¼ inch, made on light plate mills. Next there must be deducted the entire tonnage of universal mill plates, 1,224,234 tons. Less than 2 per cent of the universal mill plates were 48 inches wide or over, and less than 22 per cent were 30 inches wide or over. What is left is sheared plates, ¼-inch and heavier, amounting to 1,865,642 tons. Not all of that, even, can be drawn for shipbuilding, for ¼-inch is too light and some of the mills contributing to the total are unable to roll plates wide enough. The average capacity during 1916 of mills capable of rolling ship plates was probably not over 125,000 tons a month at the outside. The present capacity is probably under 150,000 tons a month. The capacity in course of erection, by the new plans of the Worth Brothers, Bethlehem, Carnegie at Homestead, Illinois, Brier Hill, Corrigan, McKinney & Co. and Ashland, is estimated at 75,000 or 80,000 tons a month. In some quarters it is estimated that the various times of completion of these items of new construction average about Jan. 1, 1918. For some time to come, we cannot reckon upon more than about 150,000 tons a month as the total capacity available for ship plates.

Roughly speaking, it probably requires in the neighborhood of 30 gross tons of plates for 100 tons gross register of vessel capacity. If so, the entire plate rolling capacity available would take care of about 500,000 gross register tonnage of vessels a month, to be built in the United States if or when shipyard and other fabricating capacity can be marshaled, minus the tonnage required for war craft and for exports, for there is no occasion to deprive shipyards abroad of plates they can so well use for the common end.

Now, while the strain upon the one description of plate rolling capacity is going to be so severe, the total of 150,000 tons a month considered available for shipbuilding is only between 5 and 6 per cent of our total current output of rolled iron and steel. What is a strain to the limit at one point is practically nothing at all to the iron and steel industry as a whole.

The Failing Natural Gas Supply

Ohio industrial companies as well as others in the adjoining States are deeply concerned over the outlook for the natural gas supply. Recently a natural gas survey was made under the direction of the Public Utilities Commission of Ohio, but the report of it just published gives manufacturers little information as to the extent to which they can depend on natural gas for fuel next winter. Some light has been shed on the subject by G. L. McKibben, gas and water engineer of the Ohio Utilities Commission, in a paper read before the Cleveland Engineering Society last week. In his opinion unless something is done to conserve the supply and prevent waste, the end of the use of natural gas for industrial purposes in Ohio is in sight. The report of the survey states that as the outlook for an increased supply is not flattering, with the prospect that the demand is likely to increase, it is necessary to take immediate steps not only to conserve the natural gas supply, but to use every means to stop the waste.

The dependence of Ohio manufacturers on natural gas, which comes largely from the West Virginia fields, is indicated by the fact that 2499 industrial consumers in the State in 1915 used 146,724,989,000 cubic feet of gas. The shortage last winter was much more severe than in any previous winter, what with the increased demand resulting from the remarkably severe weather, the unusual scale on which manufacturing plants were being operated and the high price and shortage of coal. Many industries were badly crippled for weeks because of the lack of fuel.

The Ohio gas survey has been made, it is announced, with a view to organizing the various industrial consumers so that the Utilities Commission may control the gas consumption in a way that will best serve the interests of all. The State gas engineer has suggested a conference on the subject between the Utilities Commission, the gas companies and civic bodies. While something may be done to conserve the supply and prevent waste, such efforts will not go far toward supplying a demand that is increasing every year. The policy of the State is to cut off or reduce the supply to industrial users when there is not sufficient gas for these and domestic consumers. This has led many industrial concerns to substitute oil or other fuel or to put in equipment that will relieve them of entire dependence on gas when there is a shortage.

CORRESPONDENCE

Transverse Fissures in Rails

To the Editor: An article recently published in THE IRON AGE by George W. Dress on the subject of "Transverse Fissures in Steel Rails," apparently complicates considerably the important matter of ascertaining the cause of these dangerous defects. Mr. Dress suggests that fissures are possibly due to tears or cracks produced in rolling the ingot or bloom, and he associates these defects with the question of unequal expansion or contraction in a section of an ingot or bloom that is in the state of being heated or cooled. Without wishing to detract from the importance of Mr. Dress's contribution, it being obviously necessary to approach the question of "what makes fissures" from every possible angle, the writer hesitates to admit the influence of these matters, either directly or indirectly, on the production of the commonly styled transverse fissures found in rails.

Heating cold steel in the form of ingots or blooms means, of course, that the exterior is expanding rapidly, and thus pulling away from the interior of the mass. No doubt at times the tenacity of the interior is exceeded, and an interior rupture is produced, the incident being accompanied by a report like an explosion. If the rupture did not extend to the surface it is possible that subsequent rolling would cause the fracture to mend or weld together, as blowholes are supposed to do. On the other hand, if the interior fracture did not mend, it is almost certain that further rolling would make it break through to the surface of the mass and create the tear or crack referred to.

These defects are commonly seen on the surface of an ingot that is being bloomed, and while then generally of a transverse character they rapidly change to

longitudinal defects in the later rolling. Frequently, flaws or tears of this character "roll out," and cannot be easily detected by surface examination of the finished rails; but, admitting their presence, it must be conceded that they are in the nature of a longitudinal defect, more like a short seam rather than of a transverse character like the fissures found in rails. This change of direction from transverse to longitudinal defects would also occur even if the interior rupture caused by expansion did not mend in the later rolling.

When the other condition occurs, *i.e.*, cooling hot steel in the form of ingots or blooms, the exterior is shrinking and the interior of the mass retarding it, with the result that again if any cracks develop they would most likely show on the surface in blooming and eventually be made into longitudinal defects in the finished rails.

Speaking of transverse fissures in general, it is surprising to observe that so little effort is being directed toward the determination of the exact chemical and microscopic conditions of the steels containing fissures. The medical profession seeks a cause for disease by endeavoring to locate and isolate the germ that is responsible. In this they have been eminently successful. But with transverse fissures, it would seem as if some authorities were prone to accept the steel as properly constituted chemically and microscopically almost without question, and then when failure occurs to attribute it to some form of overtaxing of strength or fatigue, a diagnostic procedure criticised by medicals now for being insufficiently thorough.

The last government report on a transverse fissure occurring on a Texas railroad rather briefly refers to the chemical and microscopic composition of the rail in question and passes quickly to matters of stress and strain as the principal cause for the failure. The average chemical analysis of the rail as given in the report was: Carbon, 0.71 per cent; manganese, 0.77; phosphorus, 0.121; sulphur, 0.030; silicon, 0.003. Aside from the fact that this represents a very unusual, if not questionable, steel for any purpose, there are indications that some deoxidizer other than silicon was used. A large amount of aluminum was probably added to each mold as the ingots were being cast in order to kill the obviously wild metal. Thus a peculiar condition of steel, especially for rails, is at once established which, the writer should think, ought to lead to investigation along metallurgical lines rather than to those of a mechanical and mathematical character.

Competent metallurgists have repeatedly written of the sonims or impurities existing in steel. Many have been microscopically recognized and only recently the presence of alumina, identified in the softer grades of steel, was subjected to some criticism. The addition of aluminum to high-carbon rail steels in which the manganese content is also high, and to which silicon may or may not have been added, is a practice comparatively new, say of only 10 or 15 years' standing. In that time practically all the steel developing transverse fissures has been made. Singularly, but I think indisputably so, steel which has probably had the largest amount of aluminum added to it in the molds is that in which the largest number of transverse fissures have been found.

C. W. GENNET, JR.

Chicago, June 1.

Six-Day Furnace Dismantled

The old Jefferson furnace in Jackson County, Ohio, which was built in 1854, has been dismantled. It was one of the first charcoal furnaces to be operated in Jackson County. At the start it was a cold-blast furnace, and about 10 years ago it was changed into a hot-blast furnace. As recent estimates for repairs amounted to about what it would cost to erect a new furnace, dismantling was decided upon.

It is interesting to note that Jefferson furnace was never operated on Sunday. Its first stockholders believed in the strict observance of that day, and one of their first actions after organizing the company was to establish this rule, which was in effect until the fires were drawn for the last time.

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GAIN OF FOUR FURNACES

May Pig-Iron Rate Falls Off Slightly

Largest Number of Furnaces in Years Now in Blast

Pig iron production fell off slightly in May, being at the rate of 110,238 gross tons a day, as against 111,165 tons a day in April, though with 31 days the May production came up to 3,417,340 tons, against 3,334,960 tons in April. There was irregular working in a number of districts, coke shortage being a factor in some cases, while in the Hanging Rock district labor troubles cut down output. The number of furnaces blown in exceeded those blown out or banked by four, so that 340 furnaces, with an estimated daily capacity of 111,704 tons, were active on June 1, against 336 furnaces with a daily capacity of 111,552 tons one month previous. More furnaces are now in blast than in many years. The rate of output in May was exceeded only by that of the preceding month and those of October and November, 1916.

Among furnaces blown in in May were Buffalo Union C and one Lackawanna at Buffalo, Wharton No. 3 in New Jersey, one Palmerton in the Lehigh Valley, one Edgar Thomson, one Duquesne and one Carrie in the Pittsburgh district (after banking), Princess in Virginia, one Ashland in Kentucky, Miami in southwestern Ohio, one Sloss in Alabama, and Johnson City in Tennessee.

The furnaces blown out last month included one Clairton in the Pittsburgh district, one Farrell in the Shenango Valley, Colonial, Earlston and Punxsutawney in western Pennsylvania, one Lorain (banked) and one Central in northern Ohio, Globe and Jisco (banked) in the Hanging Rock district, and one South Chicago in Illinois. A number of furnaces were banked for short periods in the month, but resumed before June 1.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from May, 1916, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
May, 1916	77,706	30,716	108,422
June	76,526	30,527	107,053
July	74,397	29,620	104,017
August	74,617	28,729	103,346
September	76,990	29,755	106,745
October	81,639	31,550	113,189
November	80,141	30,253	110,394
December	74,264	28,273	102,537
January, 1917	72,394	29,249	101,643
February	65,280	29,193	94,473
March	73,731	31,132	104,863
April	79,031	32,134	111,165
May	77,722	32,516	110,238

Capacity in Blast June 1 and May 1

The following table shows the daily capacity in gross tons of furnaces in blast June 1 and May 1 by districts:

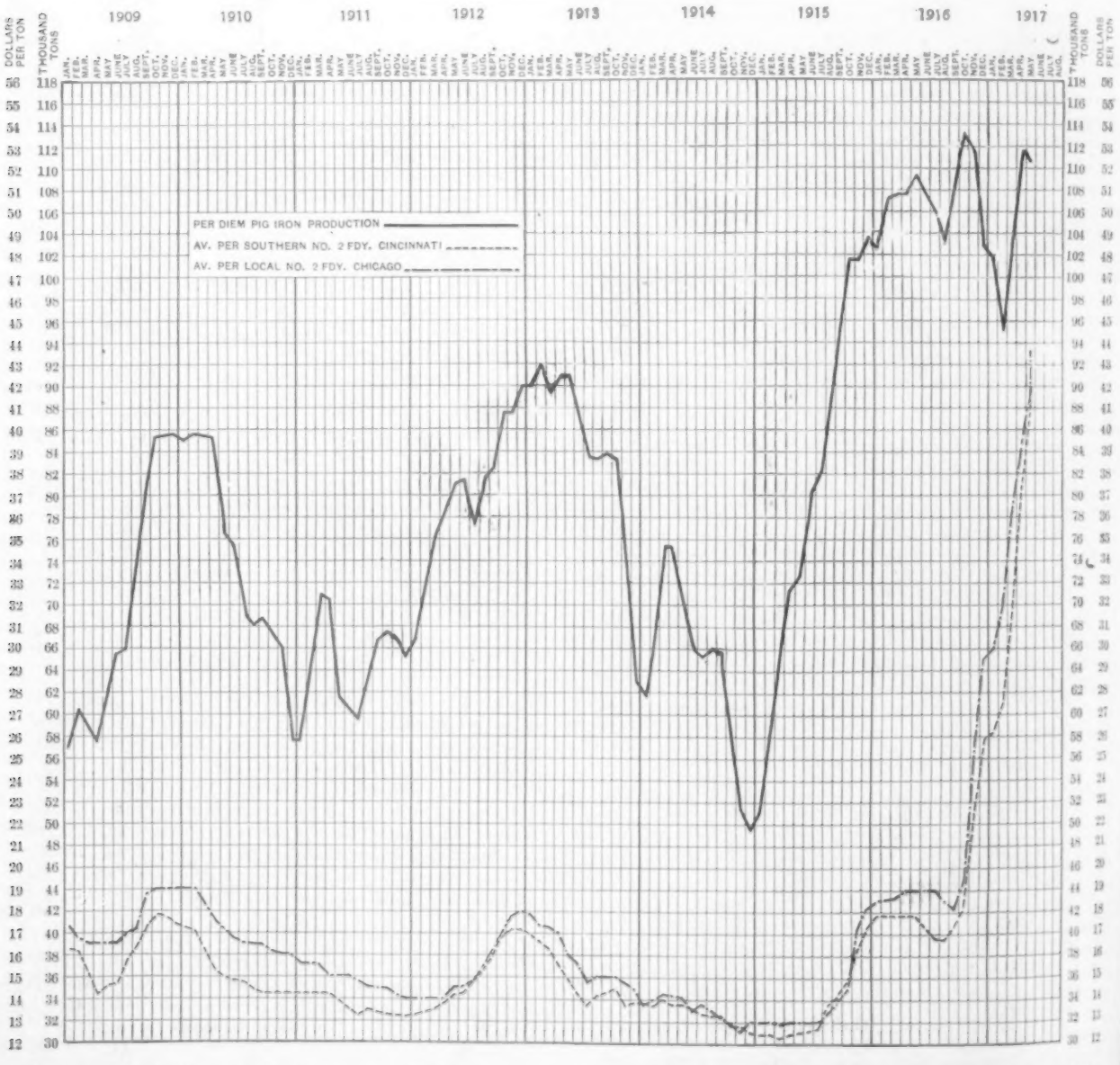

Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to June 1, 1917; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	June 1 Number in blast	June 1 Capacity per day	May 1 Number in blast	May 1 Capacity per day
New York:					
Buffalo	19	18	5,965	16	5,603
Other New York	5	3	650	3	682
New Jersey	6	3	655	2	289
Pennsylvania:					
Lehigh Valley	21	14	3,705	14	3,982
Spiegel	2	2	215	1	107
Schuylkill Val.	12	11	3,243	10	2,821
Spiegel	1	0	0	1	59
Lower Susquehanna	7	6	1,584	6	1,443
Lebanon Valley	7	6	985	6	1,039
Ferro and Spiegel	3	3	165	2	113
Pitts. District	52	46	22,536	44	21,712
Ferro and Spiegel	4	4	545	3	300
Shenango Val.	19	18	5,929	19	6,384
Western Pa.	25	18	6,240	22	6,962
Ferro and Spiegel	3	3	350	2	295
Maryland	3	4	1,444	3	1,160
Ferro	1	0	0	1	103
Wheeling Dist.	14	12	4,167	12	4,318
Ohio:					
Mahoning Val.	25	25	10,832	25	10,914
Central and Northern	26	23	8,686	25	9,436
Hocking Val., Hang. R'k & S. W. Ohio	15	13	1,866	14	1,885
Illinois and Ind.	37	33	16,064	34	16,534
Ferro	2	1	77	1	69
Michigan, Wis. & Minn.	12	11	2,689	11	2,939
Colorado & Missouri	5	4	1,122	3	961
Ferro	2	1	121	2	236
The South:					
Virginia	18	12	1,561	11	1,487
Kentucky	5	4	620	3	442
Alabama	37	30	8,404	29	8,168
Ferro	1	1	80	1	37
Tennessee	15	11	1,204	10	1,072
Georgia	..	..	....	..	....
Total	404	340	111,704	336	111,552

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in May and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	Feb. (28 days)	Mar. (31 days)	Apr. (30 days)	May (31 days)
New York	135,646	176,550	188,547	198,111
New Jersey	5,765	6,271	6,863	9,485
Lehigh Valley	106,371	127,118	119,962	117,584
Schuylkill Valley	73,081	84,758	86,416	100,531
Lower Susquehanna and Lebanon Valley	62,350	69,152	80,673	83,985
Pittsburgh district	522,572	697,487	705,992	690,919
Shenango Valley	146,323	171,534	183,288	176,200
Western Pennsylvania	159,774	198,734	202,733	211,621
Maryland, Virginia and Kentucky	75,235	87,991	94,754	106,768
Wheeling district	109,236	125,021	129,569	129,169
Mahoning Valley	274,941	324,862	323,683	335,797
Central and Northern Ohio	181,263	279,124	283,067	276,712
Hock. Val., Hang. Rk. & S. W. Ohio	43,131	49,517	56,556	55,544
Chicago district	389,557	438,975	470,338	506,297
Mich., Minn., Mo., Wis. and Col.	107,257	120,804	124,088	122,312
Alabama	222,246	258,695	246,164	260,969
Tennessee	31,399	34,759	32,267	35,336
Total	2,645,247	3,251,352	3,334,960	3,417,340

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production 1915	1916	1917	Spiegeleisen and ferromanganese 1915	1916	1917
Jan.	1,115,944	2,251,035	2,244,203	18,041	24,866	38,792
Feb.	1,237,380	2,183,845	1,829,846	13,319	23,877	32,137
Mar.	1,551,082	2,365,116	2,285,430	12,274	29,388	36,563
Apr.	1,584,111	2,316,768	2,370,937	12,337	31,862	39,595
May	1,694,290	2,408,890	2,409,380	13,440	35,844	42,701
June	1,770,657	2,295,784	.....	19,200	38,597	.....
July	1,949,750	2,306,303	.....	17,854	31,353	.....
Aug.	2,101,818	2,313,122	.....	27,463	33,338	.....
Sept.	2,129,322	2,309,710	.....	23,159	29,451	.....
Oct.	2,281,456	2,530,806	.....	23,992	34,566	.....
Nov.	2,198,459	2,404,210	.....	28,741	44,975	.....
Dec.	2,283,047	2,294,620	.....	25,004	43,470	.....

Diagram of Pig-Iron Production and Prices

The fluctuations in pig-iron production from January, 1909, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production by months of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1913—Gross Tons

	1913	1914	1915	1916	1917
Jan.	2,795,331	1,885,054	1,601,421	3,185,121	3,150,938
Feb.	2,586,337	1,888,670	1,674,771	3,087,212	2,645,247
Mar.	2,763,563	2,347,867	2,063,834	3,337,691	3,251,352
Apr.	2,752,761	2,269,655	2,116,494	3,227,768	3,334,960
May	2,822,217	2,092,686	2,263,470	3,361,073	3,417,340
5 mo.	13,720,209	10,483,932	9,719,990	16,188,865	15,799,837
June	2,628,565	1,917,783	2,380,827	3,211,588	.....
July	2,560,646	1,957,645	2,563,420	3,224,513	.....
Aug.	2,545,763	1,995,261	2,779,647	3,203,713	.....
Sept.	2,505,927	1,882,577	2,852,561	3,202,366	.....
Oct.	2,546,261	1,778,186	3,125,491	3,508,849	.....
Nov.	2,233,123	1,518,316	3,037,308	3,311,811	.....
Dec.	1,983,607	1,515,752	3,203,322	3,178,651	.....
Total yr.	30,724,101	23,049,752	29,662,566	39,039,356	.....

The figures for daily average production, beginning January, 1910, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1910—Gross Tons

	1910	1911	1912	1913	1914	1915	1916	1917
Jan.	84,148	56,752	66,384	90,172	60,808	51,659	102,746	101,643
Feb.	85,616	64,090	72,442	92,369	67,453	59,813	106,456	94,473
Mar.	84,459	70,036	77,591	89,147	75,738	66,575	107,667	104,882
Apr.	82,792	68,836	79,181	91,759	75,665	70,550	107,592	111,165
May	77,102	61,079	81,051	91,039	67,506	73,015	108,422	110,238
June	75,516	59,585	81,358	87,619	63,916	79,361	107,053	.....
July	69,305	57,841	77,738	82,601	63,150	82,691	104,017	.....
Aug.	67,963	62,150	81,046	82,057	64,363	89,666	103,346	.....
Sept.	68,476	65,903	82,128	83,531	62,753	95,085	106,745	.....
Oct.	67,520	67,811	86,722	82,133	57,361	100,822	113,189	.....
Nov.	63,659	66,648	87,697	74,453	50,611	101,244	110,394	.....
Dec.	57,349	65,912	89,766	63,987	48,896	103,333	102,537	.....

Blast Furnace Notes

No. 3 furnace of the Wharton Steel Company at Wharton, N. J., was blown in May 24. Furnace No. 1 was blown in April 12. It is expected that furnace No. 2 will be completed and put in operation about June 15. Its capacity as well as that of furnace No. 3 is 500 tons a day.

Goshen furnace, Goshen, Va., recently acquired by the Miami Metals Company, Chicago, was last active in 1910. Extensive repairs will be made and the furnace will go in blast in September.

The Matthews Iron & Mining Company now expects to blow in its furnace at Rome, Ga., between June 20 and 25.

In the Pittsburgh district 50 furnaces out of 56 are now in blast. Those idle are one Clairton, two Edgar Thomson, Edith, one Isabella and Neville Island.

Plans are nearing completion to put the Oriskany blast furnace at Lynchburg, Va., now making pig iron, on ferromanganese in the near future.

Ferromanganese Imports Large in April

Ferromanganese imports into the United States in April, from official data furnished THE IRON AGE, were 6846 gross tons, the largest of any month this year, those for January having been 6211 tons; February, 6379 tons, and March, 5324 tons. The April receipts came through Atlantic ports as follows: Philadelphia, 1430 tons; Baltimore, 4800 tons, and New Orleans, 616 tons. The total receipts to May 1 have been 24,760 tons, or at the rate of 6190 tons per month. This compares with 7577 tons per month in 1916.

The offices of Allen S. Davison & Co., sales manager and operator of the Basic Products Company, Bessie Furnace Company, Cambrian Limestone Company and Sharpsville Furnace Company, have been removed to rooms 2116-2122 Oliver Building, Pittsburgh.

Iron and Steel Markets

EXCITED PIG-IRON MARKET

Bessemer Reaches $50 on Large Sales

Movement Includes Old Material and Affects the Entire Steel Situation

Pittsburgh has signalized the arrival of $50 pig iron by one of the most exciting weeks in the Bessemer iron market since the beginning of the war. Sales have amounted to 75,000 tons, of which one steel company took 40,000 tons at prices ranging from $46 to $50. At the latter figure at least 20,000 tons has been sold.

Not only pig iron but semi-finished and finished steel markets have felt the developments at Pittsburgh, since they confirm what has been well-considered opinion in the trade for some weeks, that future war advances were likely to come as abruptly as any that have come in the past two years, and might go to lengths even now thought impossible.

The week's advance in Bessemer iron has been $5, and that in basic iron $3, or to $45. Considerable transactions in basic are pending, including one lot of 20,000 tons, and sellers indicate that $48 is likely to be paid for some of this iron.

Taken in connection with the furore in the melting steel scrap markets, from Pittsburgh to St. Louis, in the past two weeks, the sensational Pittsburgh movement plainly reflects as insistent a demand for all steel-making materials as was seen when semi-finished and finished steel were $50 a ton lower.

All steel scrap markets—including those of the East, which have been strangely backward—have been stirred up by the activity of various steel companies, and the possibility of a limited Lake ore supply, with higher pig-iron prices in consequence, has contributed to advances in all forms of old material. At Pittsburgh, one steel company has taken 40,000 tons of heavy melting scrap and over 25,000 tons of borings. Low phosphorus scrap has sold up from $45 to $51 at Pittsburgh, and heavy melting steel at $35 and higher.

While foundry iron has not been active, its upward movement continues. At Chicago, local iron has advanced to $47, and some makers who have been selling for 1918 at $2 to $3 less than for this year now ask $47 for either delivery. Coke, in line with all raw materials, is $1 higher this week, selling at $10 at ovens.

Other advances include $5 on sheet bars, $3 on cast-iron pipe, $5 a ton on refined iron bars, and $5 on railroad spikes. Practically all weeks bring some advance in plates, and mill prices vary widely. At Pittsburgh, 7c. to 8c. represents the range on tank plates, and 9c. to 12c. on ship plates.

The whole situation in steel products turns on the plans being worked out at Washington, from which plate, structural and sheet mills in particular are constantly getting orders. Of the steel needed for the 7,500,000 3-in. shells the Government is buying, a Central Western company will work about half of the 50,000 tons into shell forgings. Some questions as to the Government's specifications for shell steel are yet to be settled.

One important interest in the Pittsburgh district is now furnishing enough plates on Government account for the building of three 3000-ton vessels a week, and when another plate mill is finished in the coming fall it will be able to roll sufficient plates for one 3000-ton boat a day.

The Government's $80,000,000 program of navy yard extensions and other work, including hangars, gun shops, submarine bases, etc., has been pouring in heavy requisitions on steel mills, machine-tool builders, and many other concerns in the metal-working trades.

The question of labor supply is giving no little concern. At Chicago the exodus of men to farm work is severely felt. Steel mills and machine shops, blast furnaces and coke operations may need Government co-operation in their efforts to maintain forces now that conscription is a factor.

There are indications that steel for cars and locomotives must have preference after Government and Allies' needs for shells and ships, if the railroads are to succeed with the war transportation problem.

Pig-iron production in May was 3,417,340 tons, or 110,258 tons a day, against 3,334,960 tons in April, or 111,165 tons a day. Coke troubles cut down output in several districts, and yet more furnaces are getting in blast. The net gain in May was four, making 340 on the active list, the largest number in many years. The daily capacity of active furnaces on June 1 was 111,704 tons, against 111,552 tons on May 1. May pig-iron output was only exceeded by that of the previous month and of October and November, 1916.

Pittsburgh

PITTSBURGH, PA., June 5, 1917.

The past week has been an exciting one in the pig iron and steel trades and sensational advances in prices have taken place. Bessemer pig iron is up $5 per ton, basic iron $3 per ton or more, foundry iron about $4, malleable Bessemer $3 and mill iron about $3 per ton. Sales of Bessemer have reached in the past week close to 75,000 tons, prices ranging from $46 up to $50 at Valley furnace. Sales of basic have not been so heavy, but prices have ranged from $42 to $45 at Valley furnace. It is confidently believed that within two or three days, heavy sales of basic will be closed at probably as high as $48 at Valley furnace. There have been some sales of soft open hearth sheet bars at $100 at mill and it is said that $105 has been done. Prices on Bessemer ferro silicon are up $10 per ton and on silvery iron about $5. Refined iron bars are up $5 per ton and several makers of wire products have virtually retired from the markets as sellers and are expected to announce higher prices in the near future. Soft Bessemer and open hearth rods have sold as high as $95 per ton

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	June 6, 1917.	May 29, 1917.	May 9, 1917.	June 7, 1916.
No. 2 X, Philadelphia	$45.50	$45.50	$42.50	$20.25
No. 2, Valley furnace	**45.00**	43.00	42.00	18.00
No. 2 Southern, Cin'ti	42.90	42.90	40.90	17.65
No. 2, Birmingham, Ala.	40.00	40.00	38.00	14.75
No. 2, furnace, Chicago*	**47.00**	46.00	42.00	19.00
Basic, del'd, eastern Pa.	42.50	42.50	38.00	20.00
Basic, Valley furnace	**45.00**	42.00	42.00	18.00
Bessemer, Pittsburgh	**50.95**	45.95	44.95	21.95
Malleable Bess., Ch'go*	**47.00**	46.00	42.00	19.50
Gray forge, Pittsburgh	**43.95**	40.95	40.95	18.70
L. S. charcoal, Chicago	*50.00*	50.25	46.75	19.75
Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	38.00	38.00	38.00	33.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	35.00
Bess. billets, Pittsburgh	95.00	95.00	80.00	45.00
O.-h. billets, Pittsburgh	95.00	95.00	80.00	42.00
O.-h. sheet bars, P'gh	**100.00**	95.00	80.00	42.00
Forging billets, base, P'gh	**115.00**	110.00	105.00	69.00
O.-h. billets, Phila.	95.00	95.00	75.00	50.00
Wire rods, Pittsburgh	90.00	90.00	85.00	55.00
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia	**4.659**	4.159	4.159	2.659
Iron bars, Pittsburgh	**4.25**	4.00	2.75	2.60
Iron bars, Chicago	**4.00**	3.50	3.25	2.35
Steel bars, Pittsburgh	**4.25**	4.00	4.00	2.75
Steel bars, New York	4.169	4.169	4.169	2.919
Tank plates, Pittsburgh	7.00	7.00	6.50	3.75
Tank plates, New York	**8.169**	7.169	6.669	3.919
Beams, etc., Pittsburgh	4.00	4.00	4.00	2.60
Beams, etc., New York	4.419	4.419	4.419	2.669
Skelp, grooved steel, P'gh	**4.00**	3.50	3.50	2.35
Skelp, sheared steel, P'gh	**6.00**	5.50	5.50	2.45
Steel hoops, Pittsburgh	**4.75**	4.25	4.25	2.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	June 6, 1917. Cents.	May 29, 1917. Cents.	May 9, 1917. Cents.	June 7, 1916. Cents.
Sheets, black, No. 28, P'gh	7.50	7.50	6.50	2.90
Sheets, galv., No. 28, P'gh	9.00	9.00	8.00	4.75
Wire nails, Pittsburgh	3.50	3.50	3.50	2.50
Cut nails, Pittsburgh	4.00	4.00	3.75	2.60
Fence wire, base, P'gh	3.45	3.45	3.45	2.45
Barb wire, galv., P'gh	4.35	4.35	4.35	3.35
Old Material, Per Gross Ton:				
Iron rails, Chicago	**$40.50**	$38.50	$32.50	$18.50
Iron rails, Philadelphia	**38.00**	35.00	34.00	20.00
Carwheels, Chicago	**34.00**	33.00	24.25	12.75
Carwheels, Philadelphia	**31.00**	30.00	27.00	16.50
Heavy steel scrap, P'gh	**35.00**	30.00	28.00	16.00
Heavy steel scrap, Phila.	**28.00**	26.00	25.00	16.00
Heavy steel scrap, Ch'go.	**33.00**	32.00	27.00	15.00
No. 1 cast, Pittsburgh	**30.00**	26.00	24.00	16.00
No. 1 cast, Philadelphia	**31.00**	30.00	28.00	17.50
No. 1 cast, Ch'go (net ton)	**27.00**	26.00	21.50	12.00
No. 1 RR. wrot, Phila.	**44.00**	42.00	41.00	16.50
No. 1 RR. wrot, Ch'go (net)	**37.00**	36.00	31.00	15.50
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	**$10.00**	$8.50	$7.50	$2.75
Furnace coke, future	**9.00**	8.00	7.50	2.50
Foundry coke, prompt	**10.50**	9.50	8.50	3.25
Foundry coke, future	**10.00**	9.00	9.00	3.50
Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	32.50	32.50	31.00	28.25
Electrolytic copper, N. Y.	32.50	32.50	31.00	28.00
Spelter, St. Louis	**9.50**	9.37½	9.12½	13.37½
Spelter, New York	**9.75**	9.62½	9.37½	13.62½
Lead, St. Louis	**11.50**	11.22½	10.25	6.85
Lead, New York	**11.50**	11.37½	10.45	7.00
Tin, New York	*60.25*	65.00	59.37½	44.25
Antimony (Asiatic), N. Y.	*24.50*	24.00	25.00	23.00
Tin plate, 100-lb. box, P'gh.	$8.50	$8.50	$8.50	$5.75

at mill. Railroad spikes are up about $5 per ton and prompt furnace coke fully $1 per ton. Very heavy advances have been made in nearly all grades of old material, steel melting scrap being up $5, due to heavy purchases by the Carnegie Steel Company. Low phosphorus melting stock has sold as high as $52, delivered at consumer's mill. All other grades of scrap are up $2 to $3 per ton or more. Chain has also gone up $10 per ton, and the conservative element in the steel trade is really becoming alarmed at the high prices that are being reached. On many grades of finished steel, mills are refusing to quote until more is known as to what government demands will be made on them. There never was a steel market like the present one and record prices have been reached on pig iron, semi-finished steel and on nearly all kinds of finished steel. How much higher the market may go only time will tell. The car situation is bad and is less satisfactory now than a month ago. Thousands of tons of steel materials are piled up in warehouses awaiting cars for shipment, and the situation in this respect is steadily getting worse.

Pig Iron.—The sensational advances in prices on Bessemer and basic pig iron are strikingly set forth in the average prices on Bessemer and basic iron for May, as just issued by W. P. Snyder & Co. The average price of Bessemer iron in May was $45.99, an increase over April of $4.66 per ton. The average price on basic in May was $41.89, an increase over April of $3.90 per ton, all these prices being f. o. b. Valley furnace. It develops that sales of Bessemer reported in May were 72,000 tons, prices ranging from $42, early in the month, to $50, the latter price having been paid for several fairly large lots of Bessemer sold on May 29 and on May 31, the latter sales at $50 bringing the average up very considerably. The total reported sales of basic were 19,000 tons, prices ranging from $40, early in May, to $45, late in the month, on several sales. In one week there has been an advance of $5 per gross ton on Bessemer iron and $3 on basic, and it is very probable that in a day or two large sales of basic will be closed at considerably above $45 at Valley furnace. The Jones & Laughlin Steel Company has been a heavy buyer of Bessemer iron, taking 40,000 tons or more at prices ranging from $46 to $50 per ton at Valley furnace. The higher price was paid by the company on one lot of 10,000 tons of Bessemer iron, and possibly on other smaller lots. Other heavy sales of Bessemer have been made at $50, including one lot of 10,000 tons, another of 5000, one lot of 3000 and another of 2000 tons. In all, it is estimated that 75,000 tons or more of Bessemer iron have been sold in the past week at prices ranging from $46, the lowest, up to $50, the highest, at Valley furnace. There have also been heavy sales of basic iron, the lowest price having been $42 and the highest, up to this writing, $45, at Valley furnace. One large lot of basic, 20,000 tons or more, is now under negotiation and may be closed in a day or two, at possibly as high as $48 at Valley furnace. These heavy advances in Bessemer and basic were forecasted in our report of last week. Prices on foundry iron, malleable Bessemer and forge are also up $2 to $3 per ton. The absolute minimum now on No. 2 foundry iron is $45 at Valley furnace. Malleable Bessemer is held at $46 to $47, and grey forge iron $44, all at furnace. We now quote standard Bessemer iron, $50; basic, $45; No. 2 foundry, $45; grey forge, $44, and malleable Bessemer, $46, all f. o. b. cars at Valley furnace. The freight rate for delivery in the Pittsburgh and Cleveland districts from Valley furnace is 95c. per ton. All the heavy sales of Bessemer and basic noted above are for delivery over the remainder of this year.

Billets and Sheet Bars.—The absolute minimum on Bessemer and basic sheet bars is now $100, maker's mill, with reports that $105 has been done, but this is not confirmed. Soft Bessemer and open hearth billets could probably be bought at about $95 at maker's mill. The scarcity in the supply of steel is steadily getting worse, due largely to the fact that steel mills making Bessemer and open hearth billets and sheet bars are conserving a part of their output until they know definitely what demands will be made on them for steel by

the Government. Prices on discard steel have also advanced, and we note a sale of close to 3000 tons at $43.50 delivered to buyer's mill. Forging billets are also higher, with reports of small sales at about $120, maker's mill, for ordinary carbon. We now quote soft Bessemer and open hearth billets at $95 to $100, and soft Bessemer and open hearth sheet bars at $100 to $105, maker's mill, Pittsburgh or Youngstown. We quote forging billets at $115 to $120 for ordinary sizes and carbons per gross ton at maker's mill.

Structural Material.—The new inquiry in the past week was light, and some of the larger structural interests are holding back from bidding on large contracts until they know more definitely what demands will be made on their output by the Government. The McClintic-Marshall Company has taken 800 tons of Government work for the Panama Canal. It is understood that the inspection sheds for the Public Service Commission in New York City have been held up for the present.

We quote beams and channels up to 15 in. at 4c. at mill for fairly prompt delivery, while small lots from warehouse bring up to 5c. and higher, depending upon quantity.

Plates.—It is reported, but not officially confirmed, that at the Homestead Steel Works of the Carnegie Steel Company enough plates are being turned out to equip three vessels per week of 3000 tons each, and that within four or five months, or when the new plate mill, now being built by the Carnegie Steel Company near the Howard Axle Works is finished, the Carnegie Steel Company will be in shape to equip one 3000-ton boat per day with plates and shapes. It is known that a large part of the output of plates of the Carnegie Steel Company has been going to the Government for some time and that its demands on this company lately have been much heavier. New car orders are light, and will likely so continue. The steel car companies do not desire to take on many more large contracts for steel cars until they know more definitely what demands may be made on them by the Government. Of the order for 10,000 cars for Russia, placed lately by our Government, the Standard Steel Car Company took 6500 and the American Car & Foundry Company the other 3500. The Greenville Steel Car Company, Greenville, Pa., has taken 1000 steel hoppers for the Union Railroad of the Carnegie Steel Company. It is almost impossible to quote prices on plates that are accurate and that correctly represent the market. On nearly every sale of plates that is made the mill takes into account whether the buyer is a regular customer, what the plates are to be used for and the deliveries wanted. A mill may sell plates to one customer at 7c. or higher, while on the next sale it may sell at a lower or at a higher price. In a general way, ¼-in. and heavier steel tank plates are about 7c. to 8c. at mill for delivery in four to six months, but in some cases small lots have brought 9c. to 10c. at mill and higher. Ship plates are quoted from 9c. to as high as 12c. at mill, depending on the quantity and when the plates are wanted. The above prices apply on domestic orders only and do not govern orders from the Government.

Steel Rails.—Very little is being done either in standard sections or light rails, the mills having all the rail orders they want, and desiring to conserve as much as possible space for Government orders for both standard sections and light rails, which may be placed with them at any time. We quote angle bars at 3.25c. to 3.50c. at mill when sold in connection with orders for rails, but on small lots as high as 4c. to 4.50c. are being quoted.

Angle bars at 2.75c. at mill, when sold in connection with orders for standard section rails, and on carload and smaller lots, 3c. to 3.25c. at mill. We quote light rails as follows: 25 to 45 lb., $60; 16 to 20 lb., $61; 12 and 14 lb., $62; 8 and 10 lb., $63; in carload lots, f.o.b. mill, with usual extras for less than carloads. Standard section rails of Bessemer stock are held at $38, and open-hearth $40, per gross ton, Pittsburgh.

Tin Plate.—The work being done by the subcommittee on tin plate is commencing to be felt, and reports now are that with all the tin plate mills bending their energies to increase, as much as possible, the output of bright plate, there will likely be enough to take care of Government demands and also of the canners and packers in making containers for vegetables, fruit and meats that must have bright tin containers. Many lines of foods heretofore packed in tin cans will have to be packed in the future, or while the war is on, in paper or other containers, and this will be a hardship on some small concerns that may not be able to get either tin or paper containers, and for a time may be forced out of business. There will be an increase in capacity for making tin plate within the next three or four months, the American Sheet & Tin Plate Company having 20 new hot mills coming on that will be ready within 90 days. There will be trouble in finding steel to operate the new tin plate capacity, but it will be secured. Practically all the tin plate output for this year has been under contract for some time, but on small current orders from stock, mills are quoting about $9.50 for primes and 25c. less for wasters, per base box. One tin plate mill outside the Pittsburgh district that expects to start this month has sold a good deal of tin plate for delivery, starting July, at $15 per base box. It developed here at the meeting last week of the metal branch of the National Hardware Association that the demand for terne plate for roofing has fallen off very much. Other cheaper grades of roofing are being substituted. Mills that heretofore made terne plate are getting away from it as much as they can, and are running on bright plate.

We quote long terne plate, No. 28 gage base, at $7.25 to $7.50; short terne plate, $12 to $12.50, maker's mill, prices depending on quantity and delivery wanted. The present schedule of prices on terne plate is as follows: 8-lb., 200 sheets, $14 per package; 8-lb., 214 sheets, $14.30 per package; 12-lb., I. C., $15.25 per package; 15-lb. I. C., $15.75 per package; 20-lb., I. C., $16.50; 25-lb., I. C., $17.25; 30-lb., I. C., $18; 35-lb., I. C., $18.75; 40-lb., I.C., $19.50.

Sheets.—Close scrutiny is being kept on all new orders for blue annealed, Bessemer black or galvanized offered to the mills, and many of them are turned down flat. In cases where the buyers state that the sheets are intended for Government use, they are required to furnish the Government proposal number, and to give other similar information before the mills will agree to quote on their orders. All the sheet mills are pursuing a most conservative policy in taking on new orders, and are refusing a good deal more business than they are taking. They desire to conserve their output as much as possible for demands already made on them by the Government and for other larger demands that will be made later.

We quote No. 3 to 8 gage, blue annealed sheets, 6.75c. to 7c.; No. 28 box annealed one pass Bessemer, cold rolled, 7c. to 7.50c.; No. 28 galvanized, 9c. to 9.50c., and No. 28 black plate, tin mill sizes, 7c. to 7.50c., all f.o.b. mill, Pittsburgh. These prices are for carload and larger lots, for delivery over the next 4 to 6 months. For fairly prompt delivery, premiums of from $5 to $10 or more have been paid.

Hoops and Bands.—Practically the entire output of hoops and bands by the larger mills has been sold up for the remainder of this year. The Carnegie Steel Company has been out of the market for some months, and any makers that have a limited amount of hoops and bands for delivery late in the year are quoting from 4.50c. for indefinite delivery up to 5c. at mill on steel hoops. On steel bands, 4c. is quoted for indefinite shipment and 4.50c. for delivery in three to four months, extras as per the steel bar card. Some sales of both hoops and bands are reported to have been made at higher prices than are quoted above.

Wrought Pipe.—For months the pipe mills have been refusing to quote on more orders than they have been taking, and this condition still prevails. The mills expect that the Government will come on them in the near future for a good deal of iron and steel pipe, and as a result they are getting indifferent about taking on any more business from domestic consumers. The output of lap-weld iron and steel pipe is sold up for this year, and if the Government should place large orders domestic consumers will have to take such deliveries as the mills will be able to make, which will be more delayed than they are now. On butt-weld iron and steel pipe some mills are quoting for delivery in about 90 days, and others from four to five months from date

of order. The National Tube Co. is still quoting the discounts that went into effect April 2. Discounts on iron and steel pipe being used by the independent mills from May 1 are given on another page.

Iron and Steel Bars.—On Friday, June 1, the Lockhart Iron & Steel Company and other makers of bar iron in this district, advanced the price from 4c. to 4.25c., or $5 per ton. The higher cost of pig iron, labor and other materials that go into the manufacture of iron bars, together with the abnormal demand, are the reasons given for this further advance. Prices on steel bars are also higher, and most concerns that have any to sell for delivery late this year are quoting 4.25c. at mill. The new demand is heavy, and specifications from large users, such as the implement and wagon building trades, are heavy. The domestic demand for reinforcing-steel bars is falling off, due to the decrease in building operations all over the country. We now quote steel bars at 4.25c. to 4.50c. for delivery late this year, and from 4.50c. to 5c. and higher from warehouse, in small lots, for prompt shipment. We quote refined iron bars at 4.25c., and railroad test bars at 4.40c. to 4.50c. in carloads and larger lots f.o.b. mill.

Muck Bar.—Muck bar is now held at $75 to $80 per gross ton at mill. Owing to the heavy advance in prices of iron, it is probable that $80 or more could readily be obtained for all pig-iron muck bar, but the local maker is sold ahead for some time.

Cold-Rolled Strip Steel.—Makers of cold-rolled strip steel are not anxious to take on new orders, as they are now three or four months back in deliveries, and the situation in this respect is not getting any better. Steel and labor are scarce, and none of the mills is able to get out a maximum output. Consumers are anxious to know what their cold-rolled steel will cost in third quarter, but as yet none of the mills has named prices for that delivery. The Government is expected to be a fairly heavy buyer of cold-rolled strip steel, and for this reason some makers are conserving part of their output in order to get this expected Government demand.

We quote on current orders 8.00c. to 8.50c. at mill, for delivery to July 1. Terms are 30 days net, less 2 per cent for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wire Products.—Local makers state they have not heard anything from their bids on the 240,000 kegs of wire nails for the Entente Allies, which went in May 28. Prices quoted on the second inquiry for this tonnage of wire nails are still very heavy, and local mills are quoting only to regular customers, requiring that all new inquiry be submitted to the home office before prices are quoted. On the recent inquiry for 5000 tons of barbed wire for Canada none of this has been placed so far as known. With the constant advance of price in pig iron and steel billets it is not unlikely that a general advance in prices on wire products may be made at an early date. The American Steel & Wire Company is still quoting prices on wire nails and wire $6 per ton lower than prices being quoted by the independent mills, the prices being quoted by the independent mills to regular customers, in carloads and larger lots, are as follows:

Wire nails, $3.50 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.55 per 100 lb.; annealed fence wire, Nos. 6 to 9, $3.45; galvanized wire, $4.15; galvanized barb wire and fence staples, $4.35; painted barb wire, $3.65; polished fence staples, $3.65; cement-coated nails, $3.40 base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 48 per cent off list for carload lots, 47 per cent off for 1000-rod lots, and 46 per cent off for small lots, f.o.b. Pittsburgh.

Shafting.—Makers report a falling off of demand in specifications of shafting from the automobile builders, but this will probably grow heavier as the Government starts to place orders for trucks, in the manufacture of which large quantities will be used. The demand from other consumers, such as implement makers and screw stock machine people, is heavy, and specifications are very active. On large rounds and squares makers are not promising deliveries for three or four months, but on smaller sizes can ship out in 90 days or less from date of order. Discounts on cold-rolled shafting range from 10 to 5 per cent off list, but in a few cases 15 per cent off list is named on desirable contracts to the larger consuming trade.

Wire Rods.—The domestic demand is heavy, and there are also large inquiries for export, mostly for Canada. Several local rod mills having a fair quantity to spare for forward delivery, are quoting as high as $95 at mill for soft Bessemer and open-hearth rods. On a recent export inquiry for soft rods, one maker quoted $120 at mill. The item of manganese in high carbon rods is making an increase of $5 to $6 per ton in their manufacture.

We quote soft Bessemer and open-hearth rods to domestic consumers at $90 to $95; high-carbon rods made from ordinary open-hearth steel, $90 to $100, and special steel rods, with carbons running from 0.75 to 0.90, $105 to $115 at mill.

Railroad Spikes and Track Bolts.—The new demand for railroad spikes is only fairly active, with railroads not as yet starting to place their contracts for second half of the year delivery, but some leading roads are covered over the remainder of this year. Prices on railroad spikes are higher, the minimum of the market now being regarded as $4 to $4.10 base. The new demand for boat spikes is very heavy, and makers are sold up for some months ahead.

We now quote railroad spikes 9/16 in. and larger at $4.00 to $4.10 base, ⅜ in., 7/16 in. and ½ in., $4.50 to $5.00 base, 5/16 in., $5 to $5.50 base. Boat spikes are about $5 base, all per 100 lb. f.o.b. Pittsburgh, but some makers are quoting above that price. We quote track bolts with square nuts at 6c. to 6.50c. to railroads, and 7c. to 7.50c. in small lots, for fairly prompt shipment.

Rivets.—Makers report the new demand very heavy, consumers are being rapidly covered on their needs for last half of this year. Deliveries of steel by the mills are still unsatisfactory and labor is also scarce, cutting down output of nuts and bolts to some extent. The export demand from India and other countries is heavy, but local makers, as a rule, are not quoting on foreign inquiry, as it is very difficult to get cars, also bottoms.

Structural rivets, $4.75 per 100 lb. base; boiler, $4.85 per 100 lb. base.

From July 1, 1917, to Oct. 1, 1917, structural rivets, $4.90 per 100 lb. base; boiler, $5 per 100 lb. base. F.o.b. Pittsburgh, Pa.

Terms: 30 days net or ½ of 1 per cent for cash in 10 days.

Nuts and Bolts.—It is not likely there will be an advance in nuts and bolts in the near future, as some makers believe that prices are amply high, and should be held where they are. The new demand for nuts and bolts is heavy, but deliveries of steel from the mills are unsatisfactory and with the scarcity of labor, are holding down output to some extent. Cars are still scarce and thousands of kegs of nuts and bolts are piled up in warehouses, awaiting cars for shipment.

Discounts in effect are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 40 per cent; small, cut thread, 35 and 2½ per cent; large, 25 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 per cent; large, 30 per cent.

Machine bolts, c. p. c. and t. nuts, small, 30 per cent; large, 20 per cent. Bolt ends, h. p. nuts, 30 per cent; with c. p. nuts, 20 per cent. Lag screws (cone or gimlet point), 45 per cent.

Nuts, h. p. sq., blank, $2.10 off list, and tapped, $1.90 off; hex., blank, $1.90 off, and tapped, $1.70 off; nuts, c. p. c. and t. sq., blank, $1.70 off, and tapped, $1.50 off; hex. blank, $1.60 off, and tapped, $1.40 off. Semi-finished hex. nuts, 50 and 10 per cent. Finished and case-hardened nuts, 50 and 10 per cent.

Rivets 7/16 in. in diameter and smaller, 40 per cent.

Coke.—The new demand for prompt blast furnace coke is quite heavy and with a scarcity in supply, due to several Greek holidays in the coke regions, prices are higher. Best grades of blast furnace coke for prompt shipment are now held at $10 to $10.25 per net ton at oven. There have been sales in the past four or five weeks of probably 150 cars at prices ranging from $9.75 to $10.25 at oven. The car supply is getting worse, and deliveries of coke to the furnaces are bad. Nothing is being done in contracts, producers of coke refusing thus far to quote, preferring to sell their coke from day to day at present high prices. We now

quote best grades of blast furnace coke for prompt shipment at $10 to $10.25 per net ton at oven. We quote best grades of 72-hour foundry coke at $10.50 to $11 per net ton at oven. *The Connellsville Courier* gives the output of coke for the week ending May 26, as 344,625 tons, a decrease over the previous week of 16,315 tons.

Boiler Tubes.—Local makers are furnishing millions of feet of iron and steel tubing for government uses, and this is causing very great delays in deliveries on contracts to domestic consumers. The output of iron and steel tube mills is sold up for a year or more ahead and no regular prices prevail. Nominal discounts, which are very much below actual prices ruling, are given on another page.

Ferroalloys.—We note only a fair demand for ferromanganese, prices ranging from $400 to $425 per gross ton at furnace for 80 per cent domestic. Nothing is being done on this market on foreign, New York importers refusing to quote. Sales are reported of two carloads of 80 per cent domestic ferromanganese at about $400 delivered. There is still a great scarcity in supply of 50 per cent ferrosilicon, and small lots are still quoted for prompt shipment at $200 per gross ton and higher. Spiegeleisen is still quoted at about $4 per point, 18 to 22 per cent bringing $70 to $80, 25 to 30 per cent $100 to $110, delivered. Prices on Bessemer ferrosilicon are up $10 per ton, and silvery iron is up about $5 per ton. Sales of 10 per cent Bessemer ferrosilicon have been made at $75 per ton at furnace for delivery over last half of this year. We now quote 9 per cent Bessemer ferrosilicon at $74, 10 per cent $75, 11 per cent $80, 12 per cent $85, 13 per cent $90, 14 per cent $100, 15 per cent $110, and 16 per cent $120. We now quote 7 per cent silvery iron at $51 to $52, 8 per cent $52 to $53, 9 per cent $54 to $55, 10 per cent $55 to $56, 11 and 12 per cent $57 to $58. All f.o.b. at maker's furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., these furnaces having a uniform freight rate of $2 per gross ton, for delivery in the Pittsburgh district.

Old Material.—In the past week or so the Carnegie Steel Company has come into the market and bought about 40,000 tons of select heavy steel scrap at $35 per gross ton delivered, and 25,000 to 30,000 tons of borings at about $20 per ton delivered, the latter for use in blast furnaces. These purchases were made from two or three local dealers, the heavy steel scrap bringing $35 per gross ton, delivered to Homestead Steel Works, Munhall, Pa., and the borings brought, as nearly as can be learned, about $20 per gross ton, delivered to blast furnaces of the Carnegie Steel Company, where they are to be used. These purchases have naturally excited the whole scrap market, and prices on all grades of scrap are up from $3 to $5 per ton. The minimum on heavy steel scrap is $35, dealers offering that price freely. There has also been a heavy movement in low phosphorus melting stock, sales having been made in the past week at prices ranging from $45, early last week, up to $51 per gross ton, delivered in the last few days. The whole scrap market is very much excited, scrap material of all kinds is scarce, and dealers look for higher prices in the near future. They point to the fact that there is a shortage in ore, also that in the past year there has been an increase of about 3,000,000 tons in open hearth steel capacity, without corresponding increase in pig iron output, and these are factors that would seem to warrant the belief of still higher prices for all grades of scrap, especially that used in open hearth steel making and in blast furnace practice. Basic pig iron has sold at $45 in fairly large lots and promises to go to $50, which the dealers construe as another argument in favor of higher prices on scrap. The Carnegie Steel Company purchased about 10,000 tons of low phosphorus melting stock early last week at $45 delivered, 3000 to 5000 tons a few days ago at $50 delivered, and 2500 tons at $51 delivered. Heavy sales of steel scrap for open hearth purposes have been made at Canton, Cleveland and other scrap consuming centers at $35 per gross ton delivered. Prices now quoted by dealers for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, as quoted by leading dealers, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$35.00 to $36.00
No. 1 foundry cast	30.00 to 31.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin	40.00 to 41.00
Hydraulic compressed sheet scrap	27.00 to 28.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	23.00 to 24.00
Bundled sheet stamping scrap	20.00 to 21.00
No. 1 railroad malleable stock	27.00 to 28.00
Railroad grate bars	19.00 to 20.00
Low phosphorus melting stock	50.00 to 51.00
Iron car axles	50.00 to 55.00
Steel car axles	50.00 to 52.00
Locomotive axles, steel	55.00 to 60.00
No. 1 busheling scrap	26.00 to 27.00
Machine shop turnings	18.00 to 19.00
Cast iron wheels	30.00 to 31.00
Rolled steel wheels	45.00 to 46.00
Cast-iron borings	20.00 to 21.00
*Sheet bar crop ends	40.00 to 42.00
No. 1 railroad wrought scrap	37.00 to 38.00
Heavy steel axle turnings	22.00 to 24.00
Heavy breakable cast scrap	27.00 to 28.00

*Shipping point.

Chicago

CHICAGO, ILL., June 4, 1917.

Continued uncertainty as to quantities which will be available for future private consumption, a more acute scarcity and higher prices for many forms of material tell the brief story of the market. One mill after another states that it has none of this or that material to sell, regardless of the price offered, one instance involving 1500 tons of angles and ship channels for which 6c., Chicago, was offered. The labor situation is bad with some manufacturers because their employees are leaving to take advantage of the high wages which Western farmers are offering. Most of these men formerly lived in the open, and farm work under present conditions is so attractive that proffers of higher wages do not induce them to stay in the shops. The mills are expediting private work which is destined for Government service, but nothing actually definite as to ultimate Government needs has been received. Nearly all the sheet makers are out of the market on one or more grades, or close to being so. Northern pig iron has gone to $47, furnace, for last-half delivery, and the makers quote the same level for first half. Cast-iron pipe has been advanced $3 a ton. High carbon and iron bars are quoted at 4c., Chicago, by some makers. Old material shows no sign of halting in its progress upward.

Pig Iron.—Buying is notably lighter than it was 10 days ago, but prices continue their upward trend. Northern No. 2 foundry, malleable Bessemer and basic are quoted at $47 furnace for delivery this year, and the effort is made to obtain the same price for any delivery up to July 1, 1918, the producers justifying this quotation by their sold-up condition. For some weeks they have maintained a $2 differential between 1917 and 1918 deliveries, but a few days ago they put their price for 1918 on a par with that for this year at $46, since which time they have gone to $47 for both deliveries. There is no question that they are heavily sold for the first half, and for the remainder of this year, and they welcome a cessation of the rush to buy. Southern No. 2 foundry is quoted at $38 to $40, Birmingham, for first half, and $40 to $42, Birmingham, for the last half. One of the features of the situation is that prices at which sales are made cover a wide spread. All depends on the amount of iron which the seller has available and the urgency of the buyer's need. Higher prices for Southern iron are looked for in view of the further advance in Northern grades. Last-half Southern iron is scarce, and, as with Northern iron, a great deal has been sold for both 1917 and 1918. The principal offerings for delivery this year consist of lots shipped to the North on consignment by the smaller producers. Preparations are under way to put into

last two furnaces at Grand River, Ky. One probably will be in operation about July 1, and make about 80 tons a day, while the other will not be ready to blow in until the fall. Ohio silveries appear to be unobtainable. Tennessee furnaces making high silicon iron are sold up for this year and their operators do not wish to sell into next year until their coke supply is assured. Malleable Bessemer is in heavy demand, one inquiry for 3000 tons coming to this market from Montreal, Canada, while other inquiries call for 1000 tons each. The makers of charcoal iron have practically none to sell for either last or first half delivery. Charcoal iron for last half of 1917, Nos. 1 to 3, is quoted $50, Chicago; Scotch and Nos. 5 and 6, $51.50. For first half of 1918, Nos. 1 to 3 are quoted $47, Chicago, and Scotch and Nos. 5 and 6 are quoted $48.50. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer, and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, Nos. 1 to 3	$50.00
Lake Superior charcoal, Nos. 5 and 6 and Scotch	51.50
Northern coke foundry, No. 1	47.50
Northern coke foundry, No. 2	47.00
Northern coke foundry, No. 3	46.50
Northern high-phosphorus foundry	47.00
Southern coke No. 1 f'dry and 1 soft	$45.50 to 47.00
Southern coke No. 2 f'dry and 2 soft	44.00 to 46.00
Malleable Bessemer	47.00
Basic	47.00
Low-phosphorus	80.00
Silvery, 8 per cent	52.75

Ferroalloys.—Domestic makers of 80 per cent ferromanganese continue to ask $425 to $450 for prompt delivery. A few hundred tons have been negotiated. In view of the lack of business it is difficult to place the price for 10 per cent ferrosilicon. The last sales were made around $70.50, Chicago.

Rails and Track Supplies.—Inquiry for 1919 delivery of rails is said to aggregate 80,000 tons, but the mills do not see the wisdom of selling that far ahead and are inclined to discourage such business. A western road has placed 5000 kegs of track bolts with the leading interest.

Quotations are as follows: Standard railroad spikes, 4c. to 4.10c., base; small spikes, 4.25c. to 4.35c., base; track bolts with square nuts, 5c. to 5.10c., all in carloads, Chicago; tie plates, $60 to $70 f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $38, base; open hearth, $40; light rails, 25 to 45 lb., $60; 16 to 20 lb., $61; 12 lb., $62; 8 lb., $63; angle bars, 3.25c., base.

Plates—Few of the mills have any plates for nearby delivery to sell at any price, but for what little are to be had the market can be called 7.689c. to 9.189c., Chicago, on fairly prompt delivery of tank plates. Makers are asking their regular customers to hold off with new business until the Government's requirements are definitely stated. Much depends on the federal ship building program, as it is not improbable that both plates and shapes may be fabricated in this district and forwarded to the seaboard for assembly. Jobbers have advanced their quotation ½c.

We quote for Chicago delivery of plates out of jobbers' stocks, 7c.

Bars.—Inquiry for mild steel bars is lighter, but prices are as strong as ever. One maker quotes 3.939c. to 4.189c., Chicago, while another quotes 4.189c. to 4.439c., Chicago. Of all finished steel products, ordinary steel bars are probably the easiest to obtain. The tendency of high carbon bars is toward higher levels, the minimum of some makers being 4c., Chicago, although the quotations of other mills range from 3.75c. to 4c., Chicago. Common iron bars range from 4c. to 4.25c., Chicago. Jobbers announce no change in their prices.

We quote prices out of store for Chicago delivery as follows: Soft steel bars, 4.50c.; bar iron, 4c.; reinforcing bars, 4.50c., base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent to plus 10 per cent.

Sheets.—Prices quoted for No. 28 galvanized sheets range from 9.689c. to 10.689c., Chicago, but the bottom of the range is difficult to find. Sales have been made at 10c., and all the producers say they have but little to sell. No. 10 blue annealed are quoted at 7.689c. to 8.189c., Chicago., and No. 28 black at about the same level. Jobbers have advanced all their quotations ½c.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 8c.; No. 28 black, 8c., and No. 28 galvanized, 10c.

Structural Material.—On 1500 tons of standard angles and ship channels, fourth quarter delivery, a local mill was offered 6c., Chicago, but its filled order books do not permit it to touch the offer. An eastern mill has exhausted its stock which it recently offered at 5c., Pittsburgh, and where it can take on any rolling it is now asking 6c. The leading producer continues to assert that it has nothing to sell and no price to name, a situation in which it is not alone. Nominally the market is 4.25c. to 4.50c., Pittsburgh, but premiums must be paid to get material. Awards of the past week were as follows:

Two tanks of Arthur, Utah, 117 tons, for the Utah Copper Company. Successful bidder unreported.

Post-office building at El Paso, Texas, 218 tons, successful bidder unreported.

Steel for main building of Pullman repair shops, Buffalo, 563 tons. To Buffalo Steel Works.

Annex to dryer building, Cedar Rapids, Iowa, Quaker Oats Company, 153 tons. To South Halsted Street Iron Works.

Jobbers quote 5c. for material out of warehouse.

Rivets and Bolts.—A new wave of buying came to an already busy market last week. Some large orders were placed by automobile and agricultural implement interests, some of which evidently hope to increase their stocks and be prepared for any eventuality. Manufacturers are hampered by the extent to which their employees are leaving their works, either for enlistment or to engage in farm work. Farmers are paying much higher wages than usual, and men who have been accustomed to out-door work are going back to it, and to do so are resisting offers of higher pay.

Mill quotations are without change, as follows: Carriage bolts up to ⅝ x 6 in., rolled thread, 40; cut thread, 35-2½; larger sizes, 25; machine bolts up to ⅝ x 4 in., rolled thread, with hot-pressed square nuts, 40-10; cut thread, 40; large size, 30; gimlet-point coach screws, 45; hot-pressed nuts, square, $2.10 off per 100 lb.; hexagon, $1.90 off. Structural rivets, ¾ to 1½ in., 4.75c. to 4.939c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 5c.; boiler rivets, 5.10c.; machine bolts up to ⅝ x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to ⅝ x 6 in., 40-2½; larger sizes, 30-5; hot-pressed nuts, square, $3, and hexagon $3 off per 100 lb.; lag screws, 50 per cent off.

Cast-Iron Pipe.—Prices have been advanced $3 a ton. Toledo placed 400 tons with the National Supply Company of that city. The United States Cast Iron Pipe & Foundry Company was low bidder on 223 tons on which Akron, Ohio, took bids June 1. Piqua, Ohio, will award 100 tons, June 11. Lockport, Ill., has an inquiry out for 225 tons, and Drake, N. D., one for 200 tons.

Quotations per net ton, Chicago, are as follows: Water pipe, 4 in., $61.50; 6 in. and larger, $58.50, with $1 extra for class A water pipe and gas pipe.

Wire Products.—The leading interest is endeavoring to equitably distribute its products, so that a maximum number of its patrons will be satisfied. Meanwhile it is not overloading with new business inasmuch as government needs must be cared for in full measure. Its prices are unchanged, and to jobbers it quotes, per 100 lb., as follows, although other makers quote on the basis of 3.50c., Pittsburgh, for wire nails:

Plain fence wire, No. 6 to 9, base, $3.339; wire nails, $3.389; painted barb wire, $3.539; galvanized barb wire, $4.239; polished staples, $3.539; galvanized staples, $4.239, all Chicago, carload lots.

Old Material.—The Steel Corporation is less active as a purchaser, but prices continue to climb, and uncertainty rules the entire market. To a large extent prices depend on the individual views of buyers and sellers, and a wide divergence in quotations is common. Startling as are some of the high prices, they have been paid by shrewd purchasing agents. Material is

not plentiful, and fear on the part of consumers that they will not get what they require is largely responsible for the situation. The Minneapolis, St. Paul & Sault Ste. Marie has issued a list of about 900 tons, the Wabash has sent out a small list, and the Pennsylvania Lines West one of several thousand tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$40.50 to $41.50
Relaying rails	42.50 to 43.00
Old carwheels	34.00 to 35.00
Old steel rails, rerolling	42.50 to 43.00
Old steel rails, less than 3 ft.	37.50 to 38.00
Heavy melting steel scrap	33.00 to 35.00
Frogs, switches and guards, cut apart	33.00 to 35.00
Shoveling steel	32.00 to 34.00
Steel axle turnings	22.00 to 23.00

Per Net Ton

Iron angles and splice bars	$38.50 to $39.00
Iron arch bars and transoms	39.50 to 40.00
Steel angle bars	32.50 to 33.00
Iron car axles	43.50 to 44.50
Steel car axles	42.50 to 43.50
No. 1 railroad wrought	37.00 to 38.00
No. 2 railroad wrought	33.00 to 34.00
Cut forge	33.50 to 34.00
Pipes and flues	24.00 to 25.00
No. 1 busheling	26.50 to 27.50
No. 2 busheling	19.50 to 20.50
Steel knuckles and couplers	32.50 to 33.50
Steel springs	34.00 to 35.00
No. 1 boilers, cut to sheets and rings	22.00 to 22.50
Boiler punchings	28.00 to 28.50
Locomotive tires, smooth	38.00 to 38.50
Machine-shop turnings	15.50 to 16.50
Cast borings	15.00 to 16.00
No. 1 cast scrap	27.00 to 28.00
Stove plate and light cast scrap	19.00 to 20.00
Grate bars	22.00 to 22.50
Brake shoes	22.00 to 22.50
Railroad malleable	27.50 to 28.00
Agricultural malleable	24.00 to 25.00

Philadelphia

PHILADELPHIA, Pa., June 4.

While specifications have not reached the mills from the fabricators to date, it is known that work on the main plant for the Westinghouse Electric & Mfg. Company at Essington, Pa., will be pushed rapidly to completion in order that turbines can be built in conjunction with the Government's ship program. From several sources it is reported that at least three large Eastern independents have been requested by General Goethals to put large tonnages of plates and shapes ahead on their schedules for the Westinghouse job, and in every case the mills have expressed willingness to comply with the request and now await specifications which are expected to arrive in the next few days. To this extent and also to the extent of inquiries for a very heavy tonnage of sheets for military equipment such as tent stoves, the Government's steel requirements as affecting production of Eastern mills are beginning to assume definite form, although a great deal of uncertainty with respect to impending Government purchases continues to be an outstanding influence in this market.

Pig Iron.—Day-to-day activity is reported by sellers of foundry iron, and the market is gathering strength with each transaction, the general feeling being that there is impending another period of rising prices. The week's trading brought no startling developments. Fair tonnages of Eastern Pennsylvania iron were sold by one agency at $46 furnace for No. 2 X for delivery over the remainder of this year, this same furnace announcing its withdrawal temporarily for next year. On a sizeable tonnage of prompt iron, $45 furnace was done by another seller, the same furnace taking a small order for first half at $43 furnace. Virginia iron is firm around $45 furnace for prompt, and in one transaction, involving good tonnage, $46 was done early in the week. A sale of some No. 3 foundry for first half shipment on a basis of $38 Birmingham is typical of the Southern iron situation as reflected by occasional sales in this market. The Baldwin Locomotive Works has sent out inquiries for from 9000 to 13,000 tons of foundry iron, and about 5000 tons of this requirement is low silicon. Little activity is noted in steel-making grades. The low phosphorus market is probably more closely sold up than anything else, and late sales of small lots for prompt and last half shipment were effected at prices of from $78 to $80 delivered. In this market, $42.50 is still the nominal quotation for basic iron. No sales are reported, and a strong undertone is shown by recent quotations of $45 to $47 with which one or two inquiries have been met. Quotations for standard brands, delivered in buyers' yards, for prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$45.50 to $46.50
Eastern Pa. No. 2 plain	45.00 to 46.00
Virginia No. 2 X foundry	47.75 to 48.75
Virginia No. 2 plain	47.25 to 48.25
Gray forge	43.00
Basic	42.50
Standard low-phosphorus	78.00 to 80.00

Sheets.—The American Car & Foundry Company is still in the market for a large tonnage of sheets, which, it is understood, will be made up into tent stoves. Mills are sold up for the year, and 8c. is now the minimum for No. 10 blue annealed in cases where an odd lot can be squeezed somehow into the schedule.

Coke.—The coke situation presents nothing new to report, conditions being very unsatisfactory from the furnace man standpoint, and prices of spot foundry coke range from $10 to $11.50, with $8.50 to $10 reported to have been done for spot furnace fuel.

Old Materials.—Demand for steel scrap in the Pittsburgh and Ohio territory has influenced this market to higher prices on nearly everything. Eastern Pennsylvania mills have not yet come in the market for steel scrap, but brokers' transactions yesterday were on a basis of several points rise over the previous day's trading, and the trend to still higher figures is in the air. A large consumer of scrap pipe is reported to have taken a fair tonnage at $30 per gross ton delivered under the new specifications of 2 ft. minimum length and 1 in. minimum diameter. Quotations covering Eastern Pennsylvania and taking freight rates from 50c. to $1.50 per gross ton, are about as follows:

No. 1 heavy melting steel	$28.00 to $29.00
Old steel rails, rerolling	36.00 to 38.00
Low phosphorus heavy melting steel scrap	44.00 to 45.00
Old iron and steel axles (for export)	47.00 to 48.00
Old iron rails	38.00 to 39.00
Old carwheels	31.00 to 32.00
No. 1 railroad wrought	44.00 to 46.00
No. 1 forge fire	21.00 to 22.00
Bundled sheets	21.00 to 22.00
No. 2 bushelings	16.00 to 16.50
Machine shop turnings	16.00 to 16.50
Cast borings	16.50 to 17.00
No. 1 cast	31.00 to 32.00
Grate bars, railroad	18.00 to 19.00
Stove plate	19.00 to 19.50
Railroad malleable	29.00 to 30.00
Wrought iron and soft steel pipe	30.00 to 31.00

Structural Material.—One important eastern independent will soon advance its minimum price for standard shapes to 6c. Pittsburgh, it was announced to-day. Another large eastern mill has withdrawn from the market, as with considerable Government work to be preferred ahead on its schedule, output is so tied up for a period of months that it is impossible to figure deliveries for more new work.

Iron and Steel Bars.—Sellers of bar iron now quote 4.659c. f.o.b. Philadelphia for carlots on contracts for period expiring July 1, an advance of $10 per ton. Mills have no openings this side of third quarter for steel bars on which the usual minimum among independents is still 4c. base Pittsburgh.

Ferroalloys.—From $400 to $450 continues to represent the price range for ferromanganese. For prompt ferromanganese, $450 has been done, and where the purchaser will take an equal tonnage for next year, the quotation is around the $400 mark. Transactions involve only small tonnages, and new developments with respect to the supply situation are absent from the week's market.

Plates.—Eastern plate mills are meeting numerous requests for contracts for the last half of this year with the announcement that they will only quote for specifications during the third quarter, and apparently no quotation has been less than 10c. base Pittsburgh for tank. Prices on new business are difficult to obtain with mills turning down nine out of every ten inquiries, and quoting only on select lots for regular customers. From 12c. to 12½c. base seems to be

minimum for boat plates. The week's inquiries were unusually heavy, largely because of specifications applying to contracts which are expiring, and to avoid losing tonnage under the monthly cancellation clause. Schedules generally are filled into next summer.

Cleveland

CLEVELAND, OHIO, June 5, 1917.

Iron Ore.—Ore shipments by water from the Lake Superior district did not fall off as much as had been expected up to June 1, being only 3,612,847 tons less than during the corresponding period last year. Some of the ore men estimated that the falling off in the movement until June 1 would be 5,000,000 tons or more, owing to the late opening of navigation and the delay in shipments due to ice in Lake Superior interfering with the movement during May. Shipments for the season until June 1 were 6,495,144 gross tons as compared with 10,107,991 tons during the same period a year ago. The May movement was 6,283,612 tons as compared with 8,449,580 tons in May, 1916. While there is little prospect of making up the loss, some ore men believe that the total movement at the end of this season will not be affected much by decreased shipments up to June 1, or in other words that the fleet will be able to bring down about all the ore that is mined. They base this conclusion on the fact that the vessel carrying capacity has increased somewhat over last year and do not believe that the record-breaking movement of 1916 could have been reached anyhow this year, owing partly to the fact that stock piles were much lower at the opening of navigation than a year ago. The slow early season movement has caused anxiety among consumers, and some have in the past week or two purchased additional small lots of ore with the view of having ore come from other sources should they be unable to secure enough of the supply previously purchased to meet their requirements. Little delay is expected in the movement from now on. Plans for increasing the car supply for handling ore were discussed at a meeting of the Lake transportation, ore and pig iron sub-committee of the Council of National Defense held in Cleveland, June 4. This was attended by a large number of blast furnace, ore and steel men from Cleveland and the Youngstown and Pittsburgh districts. It is planned to have the shippers and furnace men work together in loading and distributing the ore. Heretofore, a number of cargoes a day have often been loaded for a furnace by different shippers with the result that cars were tied up in the furnace yards. By unloading only one cargo a day for a plant the cars would not be delayed. H. G. Dalton of Pickands, Mather & Company presided at the meeting, and it was decided to appoint a committee of five to draw up plans for loading and distributing the ore with the view of increasing the car supply. Harry Coulby, president of the Pittsburgh Steamship Company, will be chairman of the committee and the other members will be appointed by Messrs. Dalton and Coulby. The Lake Superior Iron Ore Association is receiving replies to its communications sent last week to blast furnaces regarding their ore requirements, it being the desire to have consumers take only sufficient ore to run their plants until June 1, 1918. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $5.95; Mesaba Bessemer, $5.70; old range non-Bessemer, $5.20; Mesaba non-Bessemer, $5.05.

Pig Iron.—The market is not as active as it has been, but prices are higher. There is a fairly heavy demand from the East for foundry and malleable grades. Producers are so well sold up that they do not care to take on much additional business. M. A. Hanna & Company have entirely withdrawn from the market for all furnaces of which they are selling agents. A Cleveland producer has advanced its price to $47 for No. 2 foundry for this year's delivery, and $46 for next year. One Lake furnace interest is quoting foundry iron at $45 for the first half of next year, and has withdrawn from the market for this year. Another Lake furnace is quoting foundry iron at $45 for this year, and $43 for the first half of 1918. Sales of foundry iron are reported at $45 for No. 2 for this year's delivery, and of malleable at $46 for this year, and $45 for the first half of 1918. We note the sale of 400 tons of malleable at $43 for shipment to New England during the first half. A Cleveland foundry has taken 150 tons of No. 2 at $45.50 for the third quarter. Prices on Southern iron have also been marked up. For this year's delivery, No. 2 Southern is quoted at $42 furnace, and a leading sanitary interest has purchased 3000 tons or more at this price for delivery in Pittsburgh and in Louisville. Sales were made during the week at $38 and $39 for first half, but furnaces generally are now asking $40 for that delivery. We quote f.o.b. Cleveland as follows:

Bessemer	$50.95
Basic	45.30
Northern No. 2 foundry	$43.95 to 47.30
Southern No. 2 foundry	43.00 to 46.00
Gray forge	43.95
Ohio silvery, 8 per cent silicon	56.62 to 61.62
Standard low phos., Valley furnace	70.00 to 75.00

Coke.—Prices continue to advance. Foundry coke for prompt shipment is quoted at $11.50 to $12.50 per net ton at oven for standard Connellsville makes. Producers are generally declining to quote prices for contracts. Blast furnace coke for prompt shipment is quoted at $10 at oven.

Finished Iron and Steel.—New demand is not as active as it has been, although mills that have not yet covered their trade with third quarter contracts are getting numerous requests for contracts. Generally the mills are endeavoring to take on as little additional tonnage as possible, realizing that if the Government should call on them for steel, they will not be able to fill other orders. Additional Government orders have been placed, but only for small lots. There is a heavy demand for cold drawn steel, mostly for screw stock. The Toledo Screw Products Company has taken a Government order for munition work, requiring 1150 tons of cold drawn steel. The War Department has placed orders for 34,000 motor truck trailers among 15 manufacturers. A sale of open-hearth sheet bars is reported at $105. The demand for plates continues heavy and local prices are unchanged at 8c. to 8.50c., Pittsburgh. An eastern mill has advanced its price to 10c. for tank plates. There is some demand for small lots from Lake shipyards. Bar iron is quiet and is quoted at 3.75c., Pittsburgh, in this market, although this price might be shaded. The demand for sheets continues heavy and prices are very firm at about recent quotations. We quote sheets at 7.75c. to 8.50c., Pittsburgh, for No. 28 black; 7.50c. to 8c. for No. 10 blue annealed, and 9.50c. to 10c. for No. 28 galvanized. The warehouse price on blue annealed sheets has been advanced to 8c. Other warehouse prices are unchanged at 4.50c. for steel bars, 5c. for structural material and 7c. for plates.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is heavy, both in specifications and for contracts. Makers are closing contracts with large consumers for the last half and with jobbers for the third quarter. The market is firm and there is talk of further price advances because of the increased cost of raw material. Rivet prices are unchanged at 4.75c., Pittsburgh, for structural and 4.85c. for boiler rivets for June delivery, and $3 higher for the third quarter. Bolt and nut discounts are as follows:

Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 40 off; cut thread, 35 and 2½; larger or longer, 25. Machine bolts, with h. p. nuts, ⅝ x 4 in., smaller or shorter, rolled thread, 40 and 10; cut thread, 40; larger and longer, 30. Lag bolts, cone point, 45. Square h. p. nuts, blank, $2.10 off list; tapped, $1.90 off list. Hexagon, h. p. nuts, blank, $1.90 off; tapped, $1.70 off. C. p. c. and t. hexagon nuts, all sizes, blank, $1.60 off; tapped, $1.40 off. Cold pressed semi-finished hexagon nuts, 50 and 10 off.

Old Material.—Sensational price advances have been made on nearly all grades, and in spite of the fact that the market is not active. Many of the quotations are about $5 a ton higher than a week ago. Trading is largely between dealers, who have run up prices in efforts to cover on short sales. There is a wide spread in quotations on many grades, and on some it is hard to determine what the ruling prices are. Dealers believe that because of the light ore shipments so far this season, there will be an increased demand for scrap, and this has something to do with the sharp advances in price. A Canton mill is reported to have taken 1000

tons of heavy melting steel at $35, and a sale of a like amount is reported to have been made at the same price for delivery to a Cleveland mill. Steel car axles have sold at $60 for a small lot. Cast scrap has become scarce and the same is true of rerolling rails. Busheling is inactive, but a demand for this grade would probably bring out higher prices. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$30.00 to $31.00
Steel rails, rerolling	41.00 to 42.00
Steel rails, under 3 ft	37.00 to 38.00
Iron rails	37.50 to 40.00
Steel car axles	50.00 to 55.00
Heavy melting steel	32.00 to 35.00
Carwheels	27.00 to 30.00
Relaying rails, 50 lb. and over	45.00 to 50.00
Agricultural malleable	24.00 to 25.00
Railroad malleable	31.00 to 32.00
Light bundled sheet scrap	21.00 to 22.00

Per Net Ton

Iron car axles	$49.00 to $50.00
Cast borings	15.00 to 15.75
Iron and steel turnings and drillings	14.50 to 14.75
No. 1 busheling	21.00 to 22.00
No. 1 railroad wrought	37.00 to 38.00
No. 1 cast	27.00 to 28.00
Railroad grate bars	17.50 to 18.00
Stove plate	17.50 to 18.00

Cincinnati

CINCINNATI, OHIO, June 5, 1917.

Pig Iron.—A great deal of interest is taken locally in the report that several railroads in the South will construct a large number of wooden cars especially for hauling coal and pig iron. If this program is carried out, it should relieve the car shortage as far as the South is concerned in no small measure. Southern iron, in the face of its present high cost, has lately invaded nearly every market in the country. Buffalo consumers recently have bought a considerable tonnage, most of which is for shipment in the first half of next year. The open inquiry is light and buying is mostly done under cover. The largest inquiry out is from the Norfolk & Western Railroad for 1000 tons of malleable for first half shipment. Among sales made last week is one to the Louisville & Nashville Railroad of approximately 2000 tons of Southern foundry iron, 500 tons of Southern charcoal and about 300 tons of Northern foundry, all for first half shipment. Another sale was made to a large consuming interest of 2000 tons of Southern foundry iron for shipment to one of its Central Western plants. The Virginia irons have not been in evidence of late and only a few scattered lots have been sold in this territory within the past ten days. Prices in all districts continue to gain strength and $40, Birmingham basis, is minimum for this year's shipment and from $38 to $40 is quoted for the first half of next year. Northern basic, malleable and foundry are unchanged and strong at $43, Ironton, for this year and $42 for next year. The strike at the silvery iron furnaces in Jackson County, Ohio, has not yet been settled, although a conference is being held at this moment that may result in an adjustment of differences and the resumption of work in three of the leading furnaces there that are affected. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, for 1917 shipment, as follows:

Southern coke, No. 1 f'dry and 1 soft	$43.40
Southern coke, No. 2 f'dry and 2 soft	42.90
Southern coke, No. 3 foundry	42.40
Southern coke, No. 4 foundry	41.90
Southern gray forge	33.90
Ohio silvery, 8 per cent silicon	51.26
Southern Ohio coke, No. 1	44.76
Southern Ohio coke, No. 2	44.26
Southern Ohio coke, No. 3	43.76
Southern Ohio malleable Bessemer	44.26
Basic, Northern	44.26
Lake Superior charcoal	52.25

Coke.—Prices on furnace coke are very strong and on contract business in the Connellsville and Wise County fields range from $9 to $9.50 per net ton at oven. Pocahontas and New River 48-hr. coke is firm and is quoted around $10.50 on contract business. There is not enough prompt business being transacted to set a price on coke for immediate shipment. Foundry coke in the Connellsville and Wise County districts is quoted around $9.50 to $10.50 per net ton at oven and in the Pocahontas and New River districts from $10.50 to $11.50. Foundry coke already loaded on cars will bring almost any figure that the buyer asks. The car situation shows no signs of clearing up.

Finished Material.—The jobbers' price on wire nails is strong to-day at $4 per keg base and on barb wire $4.95 per 100 lb. The open weather has brought out a big demand for nails and in fact all kinds of building material. There is only a limited tonnage of plates and shapes in stock, and shipments from the mills are slower than usual. There is an excellent demand for steel bars, both plain and twisted, and we quote 4.65c. for the plain bars and 4.70c. for the twisted. Structural shapes are unchanged at 5c.; ¼-in. plates and heavier, 7c.; machine bolts, ⅜ x 4 in. and smaller, 45 per cent discount, larger and longer, 30 and 5 per cent discount; files, 50 and 5 per cent, and hacksaws, 10 per cent discount. The nearby mills are quoting No. 28 black sheets at 8.15c., Cincinnati or Newport, Ky.; No. 28 galvanized, at 10.15c. and No. 10 blue annealed at 8.15c.

Old Material.—Advances have been made on some grades of scrap as high as $4 per ton. The market is very excited and it is freely predicted that further advances will be made before a steady level is reached. Incoming shipments are much smaller than outbound shipments, so that yard stocks are decreasing steadily. In spite of the heavy advances made, scrap iron is not yet comparatively as high as pig iron. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$19.00 to $19.50
Old iron rails	31.00 to 31.50
Relaying rails, 50 lb. and up	35.00 to 35.50
Rerolling steel rails	35.00 to 35.50
Heavy melting steel rails	28.50 to 29.00
Steel rails for melting	27.50 to 28.00
Old carwheels	27.50 to 28.00

Per Net Ton

No. 1 railroad wrought	$30.00 to $30.50
Cast borings	10.75 to 11.25
Steel turnings	10.75 to 11.25
Railroad cast	23.50 to 24.00
No. 1 machinery cast	22.50 to 23.00
Burnt scrap	14.00 to 14.50
Iron axles	39.00 to 39.50
Locomotive tires (smooth inside)	35.75 to 36.25
Pipes and flues	18.50 to 19.00
Malleable cast	20.00 to 20.50
Railroad tank and sheet	18.50 to 19.00

Birmingham

BIRMINGHAM, ALA., June 4.

Pig Iron.—The most reliable reflector of the pig iron market is cast iron pipe, which rises in almost exact accordance. The leading pipe interest notified Southern offices, June 2, that prices were advanced from $53 on 4-in. as a basis, to $56, and it was indicated that $2 more would soon be added. The $53 basis was presumably founded on $35 pig iron; the new basis suggests a minimum of $38 on forward iron even for the largest consumers. The leading interest, which, however, cuts little figure in the foundry market as to quantity of foundry produced, quotes a minimum of $38 for 1918, with $40 and even $42 obtained, according to circumstances. This concern is out of spot and last half. The leading foundry interest has nothing under $42 for this year, unless it is coupled up with orders for 1918, the minimum on the latter being $38. One interest sold lots of from 100 to 700 tons for 1918 Western delivery, the total aggregating 2400 tons, on a strictly $38 basis, but during the fore part of the week lost a 300-ton order, on which $38 was quoted, the order being taken at $37. This is the last $37 iron heard from in this district. Spot car lots are going at a minimum of $40. We quote for nearby delivery, per gross ton, f.o.b. Birmingham, as follows:

No. 1 foundry and soft	$40.50 to $41.50
No. 2 foundry and soft	40.00 to 41.00
No. 3 foundry	39.50 to 40.50
No. 4 foundry	39.25 to 40.25
No. 4 foundry	39.00 to 40.00
Gray forge	38.75 to 39.75
Basic	40.00 to 41.00
Charcoal	45.00 to 46.00

Cast Iron Pipe.—Quotations on cast iron pipe have been advanced $3 per ton, making the schedule per ton f.o.b. Birmingham shops as follows: 4 in., $56; 6 in.

and upward, $53, with $1 added for gas pipe. Government contracts have materially aided the pipe shops in maintaining operations, but the cutting down of the number of cantonments may reduce the expected volume of that business. Flange pipe for oil fields is active. The Government has placed an order for 4000 tons of pipe fittings scattered among plants in Anniston, Gadsden and Birmingham.

Coal and Coke.—Some coal is moving with more freedom. Thousands of empty cars now being rushed southward are helping out the situation, but it is still bad. Milling steam coal brings $2.50 to $3.50 per ton, and much higher prices when urgent spot shipment is insisted upon. Coke remains firm around $6 to $8 for furnace and $12.50 and $14 respectively for contract and spot standard foundry, f.o.b. ovens.

Old Material.—The scrap market has been greatly stimulated by the demand on the part of mills for heavy scrap to be used where pig iron is unobtainable. Car wheels made a spurt by mounting to $22.50 to $23.50, and machinery cast also advanced around $2 and $3 per ton. Shipments are heavy. A carload of steel axles, the first shipment of that amount made in some time, brought $42. We quote, per gross ton, f.o.b. Birmingham district yards, as follows:

Old steel axles	$40.00 to $42.00
Old steel rails	20.50 to 21.50
No. 1 wrought	22.50 to 23.00
No. 1 heavy melting steel	18.00 to 19.00
No. 1 machinery cast	22.50 to 23.50
Carwheels	23.00 to 23.50
Tram carwheels	16.00 to 16.50
Stove plate and light	15.00 to 16.00
Turnings	11.00 to 11.50

Steel Bars.—Steel bars in carloads f.o.b. Birmingham, are quoted at 3.75c. to 4.00c.; iron bars at 3.40c. to 3.60c.

St. Louis

ST. LOUIS, MO., June 4, 1917.

Pig Iron.—Although the smaller consumers of pig iron are still largely in need of iron, they have been to a large extent crowded out of the market by the advancing prices and the extreme difficulties of delivery, so far as time goes. In consequence, the transactions closed during the week did not aggregate more than 2500 tons for all deliveries and this total was made up of small lots broadly scattered as to consumers. The prices, though no quotations in the accepted sense of the term are being made, are on a basis of $40 for No. 2 Southern foundry, Birmingham, for both last half of 1917 and first half of 1918. No. 2 X Chicago is being held at $46 for 1918 and $45 to $46 for last half of 1917. Some sales of fluorspar were made during the week and there were inquiries for ferromanganese, but the latter could not be supplied at any price. An interesting feature of the week was the appearance in the market of inquiries from Chicago, Cleveland and Philadelphia, as well as from foreign sources, for basic, the presumed reason in the latter case being the favorable freight rate from St. Louis to San Francisco for export by that route to foreign countries. The local furnace is considering these inquiries. Probably 20,000 tons is involved in the various inquiries, but the outcome as to closing of transactions is still somewhat problematical.

Coke.—About 3000 tons of coke was closed for in this territory during the week at advanced prices, the deliveries being through the last half of 1917 and the first half of 1918. Connellsville best selected 72-hr. foundry coke has been put at $10.50 to $11 for all deliveries, including prompt shipment, and the same figure is being asked for Wise County coke. New River coke is being held at $12 for all deliveries. By-product coke continues out of the market because of the extended deliveries under existing contracts.

Finished Iron and Steel.—In the finished product situation, no favorable developments occurred during the week, deliveries being reported more and more extended and the mill representatives devoting their time chiefly to keeping their customers in good humor so far as possible over their existing contracts. No new contracts are being made in any class of material. Movement out of warehouse has held up to the limit of ability to handle material and obtain it for delivery with no hesitancy shown in the payment of the prices asked. For stock out of warehouse, we quote as follows: Soft steel bars, 4.55c.; iron bars, 4.50c.; structural material, 5.05c.; tank plates, 7.05c.; No. 10 blue annealed sheets, 8.05c.; No. 28 black sheets, cold rolled one pass, 8.35c.; No. 28 galvanized sheets, black sheet gage, 10.75c.

Old Material.—The scrap market seems literally to have gone crazy. The prices which are being quoted give evidence that one man's guess is as good as another's so far as quotations go. As a matter of fact the conditions are such that the prices obtainable are dependent entirely upon the conditions surrounding buyer and seller at the moment of the sale. Added to the shortage of material is the extreme difficulty of getting equipment to handle scrap and the inability of railroads to relieve the situation. The outside demand, which comes from practically every point North and East, is responsible for the situation. The Colorado Fuel & Iron Company has been drawing material heavily from this market. Industries are revising their specifications and are taking material that they would not previously have considered for a moment. In consequence, too, the situation is one of wide spreads in figures given. Lists out during the week included 400 tons from the Cotton Belt; 7000 tons from the Baltimore & Ohio; 6000 tons from the Pennsylvania; 2500 tons from the Burlington; 300 tons from the Terminal Association and 200 tons from the Kansas City Southern. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$39.00 to $40.00
Old steel rails, rerolling	40.00 to 41.00
Old steel rails, less than 3 ft	35.00 to 36.00
Relaying rails, standard section, subject to inspection	45.00 to 46.00
Old carwheels	31.50 to 32.00
No. 1 railroad heavy melting steel scrap	36.00 to 37.00
Heavy shoveling steel	32.50 to 33.00
Ordinary shoveling steel	30.00 to 31.00
Frogs, switches and guards cut apart	35.00 to 36.00
Ordinary bundled sheet scrap	19.00 to 19.50
Heavy axle and tire turnings	20.00 to 21.00

Per Net Ton

Iron angle bars	$34.50 to $35.00
Steel angle bars	30.00 to 31.00
Iron car axles	46.00 to 47.00
Steel car axles	45.00 to 46.00
Wrought arch bars and transoms	38.00 to 39.00
No. 1 railroad wrought	36.00 to 37.00
No. 2 railroad wrought	33.50 to 34.00
Railroad springs	32.00 to 33.00
Steel couplers and knuckles	32.00 to 33.00
Locomotive tires, 42 in. and over, smooth inside	43.00 to 44.00
No. 1 dealers' forge	33.00 to 34.00
Cast iron borings	15.50 to 16.00
No. 1 busheling	26.00 to 27.00
No. 1 boilers, cut to sheets and rings	22.50 to 23.00
No. 1 railroad cast scrap	26.00 to 27.00
Stove plate and light cast scrap	16.00 to 16.50
Railroad malleable	25.00 to 26.00
Agricultural malleable	20.00 to 21.00
Pipes and flues	23.00 to 24.00
Heavy railroad sheet and tank scrap	19.50 to 20.00
Railroad grate bars	20.00 to 21.00
Machine shop turnings	16.00 to 17.00

Buffalo

BUFFALO, N. Y., June 4, 1917.

Pig Iron.—Demand is active and exhaustive, buyers apparently being willing to take anything obtainable, even high sulphur grades, or whatever the furnaces have to sell, but furnaces are sold up to such an extent that they have practically nothing left to dispose of for months ahead. Heavy inquiry for first quarter and half of next year is also reported, but very little tonnage is obtainable, even for that delivery. This applies to bessemer and basic as well as to foundry grades, and malleable is scarcer than the other grades. Some producing interests have stopped selling into next year, and one interest has entirely withdrawn from the market for any delivery. One of the producers states it does not care to sell under $50.00 per ton, and will not quote a lower figure; also that it will not quote at all for any delivery extending beyond three months from date of order. The price range for this year's delivery is from $45 to $50, furnace, with a minimum for No.

2X foundry of $46, and only a very moderate amount of low grade iron procurable at the lower figure. We quote as follows, f.o.b. furnace, Buffalo, for 1917 delivery:

High silicon irons	$48.00 to $50.00
No. 1 Foundry	47.00 to 50.00
No. 2 X Foundry	46.00 to 50.00
No. 2 Plain	45.50 to 46.00
No. 3 Foundry	45.00
Gray Forge	45.00
Malleable	47.00 to 50.00
Basic	47.00 to 50.00
Lake Superior Charcoal, f.o.b. Buffalo	52.00 to 53.50

Finished Iron and Steel.—May quotas were specified in full for all types of material. A number of important inquiries are in the market, all traceable to expected Government contracts. The demand for cold finished steel is extremely heavy, and several producers who were making fairly prompt delivery are now scheduled for the remainder of the year. Minimum prices seem to be 10 per cent from list, and considerable quantities are known to have been sold at full list prices for shipment from mills at their convenience. Negotiations are being carried on for the purchase of additional shipbuilding material for shipment to Canada.

Old Material.—The demand for heavy melting steel from the Pittsburgh district has raised the price in this market $2 per ton, and there is a decided scarcity of this class of scrap, particularly in strictly No. 1 heavy melting. Low-phosphorus scrap is in exceptionally strong demand, with a jump in price amounting to $4 to $6 per ton. There have also been pronounced advances in prices for No. 1 railroad wrought, old car wheels, machine shop and heavy axle turnings, iron rails, wrought pipe, No. 1 and No. 2 busheling scrap and bundled sheet scrap, ranging from $1 to $3 per ton, because of large demand. Scarcity of labor is holding back dealers in some instances from making prompt shipments. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$31.00 to $32.00
Low phosphorus	44.00 to 46.00
No. 1 railroad wrought	41.00 to 42.00
No. 1 railroad and machinery cast	29.00 to 30.00
Iron axles	45.00
Steel axles	45.00
Car wheels	28.50 to 29.50
Railroad malleable	27.50 to 28.50
Machine shop turnings	14.50 to 15.00
Heavy axle turnings	20.50 to 21.00
Clean cast borings	15.00 to 15.50
Iron rails	32.00 to 33.00
Locomotive grate bars	18.00 to 18.50
Stove plate	18.00 to 18.50
Wrought pipe	21.00 to 22.00
No. 1 busheling scrap	24.00 to 25.00
No. 2 busheling scrap	15.00 to 15.50
Bundled sheet scrap	17.50 to 18.00

New York

NEW YORK, June 6, 1917.

Pig Iron.—A very noticeable increase in inquiry for pig iron for export has been a feature of the past week. With the exception of 1000 tons of foundry iron, the inquiry is for steel making irons and includes one for 10,500 tons of low-phosphorus, one for 1500 tons of low-phosphorus, one for 600 tons of low-phosphorus and one for 1500 tons of Bessemer. Owing to the scarcity of low-phosphorus pig iron and the strong demand among domestic users, it is expected that foreign buyers will have a great deal of trouble in placing their orders. The foundry iron market is very strong. One Pennsylvania furnace which has been an active seller has withdrawn temporarily. A New Jersey cast-iron pipe manufacturer has purchased about 5000 tons of No. 3 foundry from a Pennsylvania furnace for delivery the last four months of the year. Some sales of malleable have been made at unusually high prices. We quote tidewater for early delivery as follows:

No. 1 foundry	$46.75 to $47.25
No. 2 X	45.75 to 46.25
No. 2 plain	45.25 to 45.75
Southern No. 1 foundry	44.75
Southern No. 2 foundry and soft	44.25

Steel Plates.—A domestic consumer of boiler plates has bought 2000 tons for third quarter delivery at 8.50c. at mill. It is understood that not over 20 per cent may be taken in circles. Incidentally, it seems to be a practice to employ an extra for circles which will bring the ratio of extra to unit price to about what the ratio was, for example, when plates sold at 1.50c. per lb. A few hundred tons for an export house for September and October offered at 8.25c. was refusd by one Pennsylvania mill. A boiler builder is in the market for 1200 to 2400 tons of firebox steel plates for furnaces; on this 10c. has been quoted. One eastern plate mill has put its minimum price for tank plates at 10c. Deliveries are several months behind and in some cases so little open tonnage for 1917 is available that only small lots are taken into consideration. Owing to the admitted scarcity of rolling stock, it is believed in some quarters that the case of the railroads will sooner or later receive a special consideration or else the big need of the moment will be cars rather than ships. Meanwhile, there are no notable car inquiries, though the Northern Pacific is expected soon to be a large buyer. Recent awards of cars include 20 for the Phillips Sheet & Tin Plate Company, 100 for the Youngstown Sheet & Tube Company and 50 for the Monongahela Connecting Railroad, controlled by the Jones & Laughlin Steel Company, all placed with the Pressed Steel Car Company. For ship repairs mention may be made of some 30,000 tons on which prices have been asked by J. P. Morgan & Co. Some warehouses have advanced their prices $10 per ton. On mill shipments of universal and tank plates the range is 8.169c. to 8.669c., New York, with little available before the last quarter, and ship plates are 8.169c. and higher, New York. Plates out of store are 7.50c. to 8c., New York.

Bars.—Occasional movement of bars rolled from shell discard billets is noted where 0.35 to 0.45 carbon is acceptable and 4c. to 4.25c. is the usual price. One unusual inquiry for steel of this carbon range calls for 1,000,000 to 1,500,000 pieces of 1½ in. diameter and about 4 in. long, involving 1200 tons. It is believed that there is more steel now booked than can be rolled this year and that as a general statement finished steel mills are about six months behind on deliveries. Bar iron continues strong at 4c., Pittsburgh, as a minimum. We quote steel bars at 4.169c. to 4.669c., New York, and iron bars at 4.169c., New York. From New York district warehouses iron bars are sold at 4.60c. and steel bars at 4.75c.

Structural Material.—Government inquiries have been the dominant factor in a rather dull market recently. They seem to be the majority of those which have resulted in contracts recently, most of the business which appeared early in May having been dropped. The McClintic-Marshall Company will furnish the 5200 tons for the machine shop and foundry for the Norfolk Navy Yard. George Baker Long is low bidder on the 4000 tons for the structural shop of the Brooklyn Navy Yard and Warren Moore & Co., Philadelphia, is low bidder for 2000 tons for power houses for the Norfolk and League Island Navy Yards. For a Government magazine at St. Julian Creek, 800 tons, the Roche Construction Company is low bidder. Milliken Brothers, Inc., is reported to have taken 600 tons for the American Stamping Company at Bridgeport, Conn. The proposition to double track viaducts for the Virginia Railway is again up for bids, but this time involves about 800 tons instead of 1100, the number of viaducts having been reduced from four to three. The Public Service Commission, New York, has withdrawn the 2300 tons involved in the construction of inspection sheds. The Government is in the market for numerous ammunition store houses along the seaboard, each involving 100 to 400 tons; one is to be located near Fort Mifflin and another at Pensacola, Fla. The Government also has under consideration several reinforced concrete naval storage houses. The various railroads are inquiring from week to week for material for new bridges or repairs to old ones, the total at present before the market being about 1000 tons. We quote plain material from mill at 4.419c. to 4.919c., New York, the lower price in three to four months and the higher for small lots in earlier deliveries. For future shipments, 4.169c. seems to be the minimum. Shipments from warehouses are 5c. per pound, New York.

Ferroalloys.—The market for ferromanganese is quiet but very strong. Inquiry for fairly large amounts is reported and sales of lots of 2000 to 3000 tons of the domestic product have been made in the last week at $450, delivered, for the last half and in some cases for the first quarter of next year. Further sales of substantial amounts are expected to be closed in the near future. Receipts from England in May are generally reported as normal under the present circumstances, and it is said that the alloy committee of the Council of National Defense has received assurances that no less than the usual quantities of British alloy will be available during the balance of the year. It is estimated that the consumption of ferromanganese in the steel industry for the rest of the year will be not less than 1000 tons per day. According to the blast-furnace reports to THE IRON AGE the production of ferromanganese was nearly 21,000 tons last month, bringing the average production per month for the last seven or eight months to 20,000 tons. Spiegeleisen, 20 per cent, is strong and active at $80 to 85, furnace. Demand for 50 per cent ferrosilicon continues active, with the quotations ranging from $200 to $250, delivered, depending on conditions.

Cast Iron Pipe.—The expected advance in quotations of cast iron pipe has been announced, being $3 per ton. While it is expected that the Government will do some buying in the eastern territory, it has not yet placed any orders. Carload lots of 6-in., class B and heavier, are quoted at $58.50 per net ton, tidewater, with class A and gas pipe taking an extra of $1 per ton.

Old Material.—The Eastern market for scrap has been rather slow to respond to the heavy buying of the Central West, but during the past few days the market has been very strong and nearly every kind of scrap has advanced sharply. While heavy melting steel for shipment to the Pittsburgh district is usually quoted at $29 to $30, some brokers are quoting even higher prices. Eastern mills have adopted a new method of purchasing wrought iron pipe. The new specifications call for pipe of not less than 1 in. in diameter and not less than 2 ft. long. The exercising of greater care in buying wrought iron pipe is due to the very active demand for No. 1 railroad wrought, for which the better grades of wrought iron pipe can be substituted. Brokers quote buying prices as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for shipment to eastern Pennsylvania)	$24.00 to $24.50
Old steel rails (short lengths) or equivalent heavy steel scrap	29.00 to 30.00
Relaying rails	45.00 to 50.00
Rerolling rails	35.50 to 36.00
Iron and steel car axles	46.00 to 47.50
No. 1 railroad wrought	41.50 to 42.00
Wrought-iron track scrap	37.00 to 38.00
No. 1 yard wrought, long	34.50 to 35.00
Light iron	7.50 to 8.00
Cast borings (clean)	14.00 to 14.50
Machine-shop turnings	13.00 to 14.00
Mixed borings and turnings	12.75 to 13.25
Wrought-iron pipe (1 in. min. diameter, not under 2 ft. long)	21.00 to 22.00

Machinery cast is scarce and prices are at least $2 per ton higher. Other grades of foundry scrap have advanced from $1 to $2 per ton. Dealers in New York City and Brooklyn are quoting as follows to local foundries, per gross ton, New York:

No. 1 machinery cast	31.00 to 32.00
No. 1 heavy cast (column, building material, etc.)	29.00 to 30.00
No. 2 cast (radiators, cast boilers, etc.)	25.00 to 26.00
Stove plate	18.00 to 18.50
Locomotive grate bars	18.00 to 18.50
Old carwheels	29.00 to 30.00
Malleable cast (railroad)	24.50 to 25.00

Manganese Ore Imports Continue Large

Manganese ore imports into the United States are maintaining the large average for 1916. The imports in March were 56,394 gross tons, bringing the total to April 1 to 145,720 tons, or at the rate of 48,573 tons per month for the first quarter of 1917. This compares with 48,026 tons per month in 1916, the record year. March has also been the largest month this year so far reported, the January imports having been 49,530 tons, and the February imports 39,796 tons.

British Steel Market

Tin Plates Strong and Higher—Pig Iron Is Firm—Ferromanganese Nominal

LONDON, ENGLAND, June 6, 1917.—(*By Cable*)

Foundry pig iron is firm and hematite iron is tight. Tin plates are strong at 34s. upward, with considerable inquiry from France, but sellers are scarce. Ferromanganese is strong, but nominal.

Benzol is quoted at 13d. per gal., with toluol at 2s. 3d. and ammonium sulphate nominal. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 34s. against 31s. two weeks ago.

Ferromanganese, £45 nominal.

Ferrosilicon, 50 per cent, c.i.f., £35 upward.

OBITUARY

DAVID E. PARK, aged 68, a prominent banker and formerly a steel manufacturer in Pittsburgh, died at his home in that city May 30. He retired from active life some years ago. Mr. Park was born on the Northside, Pittsburgh, Oct. 2, 1849. His father, James Park, was founder of Park Brother & Co., Ltd., crucible steel manufacturers, and later known as the Black Diamond Steel Company. Mr. Park was active in the formation of the Crucible Steel Company of America, which took over the Black Diamond Steel Company and at that time he retired from active business. With his brother, the late W. G. Park, he built the Park office building, at Fifth Avenue and Smithfield Street, Pittsburgh. He was a director of the Mellon National Bank and of the Union Trust Company of Pittsburgh.

Record Cement Shipments in 1916

Complete statistics of the Portland cement industry in 1916 show that the shipments for that year, 94,552,296 bbl., valued at $100,014,882, hold the record, and that the production, 91,521,198 bbl., is second only to that of the record year 1913, when 92,097,131 bbl. was manufactured. Higher prices for cement prevailed throughout the United States in 1916, except at a few places where top prices were realized in 1915. The average factory price per barrel in bulk at mills was $1.058, compared with $0.860 in 1915, an increase of 19.8c., or 23 per cent. These statistics, compiled by Ernest F. Burchard, of the U. S. Geological Survey, are based on returns from every active plant in the United States, and differ from the estimated figures, released Jan. 1, 1917, by only 0.04 to 0.4 per cent.

Chain Up $10 per Ton

All manufacturers have advanced prices on all grades of chain $10 per ton. The new prices are as follows: proof coil chain, 3/16-in., $11.60; ¼-in., $9.05; 5/16-in., $8.05; ⅜-in., $7.50; 7/16-in., $7.35; ½ and 9/16-in., $7.20; ⅝-in., $7.10; ¾-in., $7; ⅞-in., $6.90; 1-in., $6.80; 1⅛-in. and 1¼-in., $6.90. Extra remain the same and are as follows: B.B. 3/16 in. and ¼-in., $1.50 extra; 5/16-in. and larger, $1.25 extra; B.B.B. 3/16-in. and ¼-in., $2 extra; 5/16-in. and larger, $1.75 extra.

The Bridgeport Brass Company, Bridgeport, Connecticut, have extended to its employees a liberal plan for the purchase of Liberty bonds. The company will carry the subscription of any individual in its employ for 50 months, that is, the employee may pay for his bond in installments of 2 per cent per month of the value of his subscription. In addition to this, the company has made a large subscription in its own name.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
May	Lake	lytic	York	York	Louis	York	Louis
31	32.50	32.50	63.75	11.50	11.25	9.62½	9.37½
June							
1	32.50	32.50	63.00	11.50	11.30	9.62½	9.37½
2	32.50	32.50	....	11.50	11.37½	9.75	9.50
4	32.50	32.50	60.50	11.50	11.50	9.75	9.50
5	32.50	32.50	60.25	11.50	11.50	9.75	9.50

NEW YORK, June 6, 1917.

A generally dull market has been even duller the past week because of Decoration Day and a virtual holiday yesterday, June 5. Copper continues strong, but very quiet. Tin has had a decided decline and is inactive. Lead maintains its strength, and is higher. Spelter is very inactive, but the undertone is strong. Antimony has declined.

New York

Copper.—No purchasing of any volume is reported, but a little has been done here and there, as is always the case. The market is very quiet, but firm, and the tendency is upward. Metal desired for delivery this side of August can be obtained only through second hands, and quotations for this delivery are not uniform because of these numerous sources of supply. July delivery is quoted by some at 32c., New York, with third quarter at 30c. to 31c., but the quotation for early delivery yesterday was unchanged at 32.50c., New York, for both Lake and electrolytic. For fourth quarter delivery, 29c. to 30c., New York, is the general quotation. Exports of copper for April are reported as 44,975 tons, bringing the total to May 1 to 179,780 tons, the largest ever reported for any corresponding period before or since the war. The London market for spot electrolytic continues unchanged at £142.

Tin.—Tin has declined nearly 5c. per lb. in the last week, or from 65c. on May 28 to 60.25c., New York, yesterday. The principal cause for this recession has been lack of demand, fairly large arrivals, and a feeling that shipping permits from England will be more readily obtainable. The fact that the submarine situation seems better rather than worse has also been a factor. So far as actual transactions are concerned, however, the market has been extremely quiet, and has come practically to a halt. Holidays, which always have an adverse effect on the tin market, are one cause for the stagnation, but a stronger influence has been uncertainty as to the attitude of the Government. For these reasons the market is largely a nominal one at the quotations given above. The decided decline in the London market in the past week has also had its effect. The quotation yesterday for spot Straits was £239 15s., a decline of about £14 per ton in the last week. Arrivals in June up to and including June 4 were 300 tons, with 2052 tons reported afloat. An interesting fact is the statement that the shipments of Straits tin for May were 6866 tons, as compared with 3965 tons for May, 1916.

Lead.—The market continues very strong and is the only one that is at all interesting. Supplies are not abundant enough to meet ordinary demand and on such sales as have been made, which have not been very large, the market has advanced to 11.50c., New York. The situation is such that the price has also advanced at St. Louis to the same level as that at New York. Some resale lots have appeared in this market and odd lots of lead have sold as low as 11.25c., New York, but not enough to affect the firm price of 11.50c. The quotation of the leading interest is unchanged at 10c., New York.

Spelter.—The market may be regarded as a curious one in that futures are quoted higher than nearby deliveries, with the demand for the former greater than for the latter. Sellers are less inclined to consider future delivery. The strong position of the ore market and the uncertainty of the Government's requirements are dominating factors. In general there is not a large demand for any position, though sales are made frequently at 9.50c., St. Louis, or 9.75c., New York, for forward delivery, even as late as last quarter and at 9.37½c., St. Louis, and 9.62½c., New York, for nearby delivery. These may be regarded as the quotations. Of interest to the spelter market in its bearing on present conditions is the fact that the 1916 production in this country of galvanized sheets was 25 per cent less than it was in 1913, although the output of all kinds of sheets was 50 per cent greater than in 1913. Exports of spelter for April are given as 10,814 tons.

Antimony.—This metal is lower than a week ago, due to larger arrivals and less demand. Chinese and Japanese grades are quoted at 21c. to 22c., duty paid, New York.

Aluminum.—The market is quiet and nominal at 59c. to 61c. for No. 1 virgin metal, 98 to 99 per cent pure.

Copper Averages.—The average price of either Lake or electrolytic copper for May, based on daily quotations in THE IRON AGE, was 31.42c.

Old Metals.—The market is quiet. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	31.00 to 31.50
Copper, heavy and wire	29.50 to 30.00
Copper, light and bottoms	27.50 to 28.00
Brass, heavy	20.75 to 21.25
Brass, light	15.75 to 16.25
Heavy machine composition	27.00 to 27.25
No. 1 yellow rod brass turnings	19.50
No. 1 red brass or composition turnings	21.50 to 22.50
Lead, heavy	10.00
Lead, tea	9.25
Zinc	7.50

Chicago

JUNE 4.—The copper market is easier, following a lessened demand, although buying is still of fair proportions. Lead is slower, conditions having reversed themselves. A few days ago, sellers were reluctant to sell, whereas now they are offering, but consumers will not take hold. Spelter, while stronger, is quiet, and opinions differ radically as to its future. Tin is weaker because of the prospect that the Government may take a hand in regard to the disposition of surplus stocks, especially those held for speculation. Antimony is lower. We quote as follows: Casting copper, 31c.; Lake, 32.25c.; electrolytic, 32.50c.; tin, carloads, 61.50c.; small lots, 64c. to 65c.; lead, 11.37½c.; spelter, 9.50c.; sheet zinc, 19c.; Oriental antimony, 25c. to 26c. On old metals we quote buying prices for less than carload lots as follows: copper wire, crucible shapes, 27c.; copper clips, 26.50c.; copper bottoms, 24.5c.; red brass, 24c.; yellow brass, 18c.; lead pipe, 8.75c.; zinc, 6.50c.; pewter, No. 1, 35c.; tinfoil, 42.50c.; block tin, 47.50c.

St. Louis

JUNE 4.—Metals were without great excitement during the week, though tin eased off somewhat and lead firmed up materially. At the close to-day, in carload lots lead was quoted at 11.50c. and spelter at 9.50c. and dull. In less than carload lots, the quotations were: Lead, 12c.; spelter, 10.50c.; tin, 66c.; Lake copper, 33.50c.; electrolytic copper, 33c.; Asiatic antimony, 30c. In the Joplin district there was a sharp advance in lead ore, which sold up to $125 and in some cases to $126 per ton, basis of 80 per cent metal. There were unconfirmed reports of sales as high as $127.50 per ton. The average for the week for the district was $124 per ton. Zinc blende was rather featureless and the basis range for 60 per cent metal was $70 to $80 per ton, with the average at $76 per ton. Calamine was steady at from $38 to $45 per ton, basis of 40 per cent metal, with an average for the district of $42 per ton. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 13c.; heavy yellow brass, 14.50c.; heavy red brass and light copper, 19c.; heavy copper and copper wire, 22.50c.; zinc, 6.50c.; lead, 7c.; tea lead, 4c.; pewter, 25c.; tinfoil, 36c.

At a special directors' meeting June 4 at Youngstown, O., the United Engineering & Foundry Company declared an extra common stock dividend of 3 per cent, payable June 14 to stock of record June 9.

IRON AND INDUSTRIAL STOCKS

Steel Common Makes a New High Record in a Week of Irregularities

NEW YORK, June 6, 1917.

Last week was another period of activity in United States Steel common, and 1,542,900 shares were traded in, but the market was irregular. Steel common made a new high record last Thursday at 136½, but at the end of the week had declined to 128⅞, the net decline for the week being 1 point. There was considerable irregularity throughout the week. American Car & Foundry gained 2¼ points, Bethlehem Steel closed the week at 143½, the same as the close for the preceding week. Lackawanna Steel lost 1⅜ points. Midvale Steel recorded a loss of ⅞. Republic Iron & Steel lost 2⅜ points. Sloss-Sheffield Steel & Iron lost 1 point. There seemed to be no good reason for the weakness which developed from time to time during the period, as general conditions in the industrial world continue highly favorable. The range of prices on active iron and industrial stocks from Tuesday of last week to Monday of this week was as follows:

Allis-Chal., com.	29 - 32⅝	Gulf States Steel	124½-127½
Allis-Chal., pref.	84½- 86⅜	Int. Har. of N. J., com.	114¼-117⅞
Am. Can, com.	49¾- 52⅝	Int. Har. Corp., com.	70 - 74
Am. Can, pref.	107½	Int. Har. Corp., pref.	102 -103
Am. Car & Fdy., com.	73½- 77⅜	Lacka. Steel	95½- 98⅜
Am. Car & Fdy., pref.	118¼	Lake Sup. Corp.	20⅛- 21¾
Am. Loco., com.	72¼- 75⅝	Lima Loco.	57 - 58
Am. Loco., pref.	103¾	Lukens, com.	42 - 43
Am. Rad., com.	282½-285	Lukens, 1st pref.	103
Am. Ship, com.	77 - 77½	Midvale Steel	62 - 64½
Am. Ship, pref.	94	Nat.-Acme	31 - 31¾
Am. Steel Fdries.	67 - 73½	Nat. En. & Stm., com.	37 - 38½
Bald. Loco., com.	60¾- 66¾	N. Y. Air Brake.	147 -149¾
Bald. Loco., pref.	101 -101½	Nova Scotia Stl.	93 - 93½
Beth. Steel, com.	141½-144½	Pitts. Steel, pref.	99¼
Beth. Steel, class B	130¾-138⅝	Pressed Stl., com.	76⅛- 79½
Cambria Steel	145 -150	Pressed Stl., pref.	102⅛
Carbon Stl., com.	98 -104¾	Ry. Steel Spring, com.	52¾- 54⅞
Case (J. I.), pref.	85½	Republic, com.	89⅛- 94
Central Fdry., com.	27 - 32	Republic, pref.	104⅞-105⅞
Central Fdry., pref.	47 - 53¾	Sloss, com.	60 - 63⅞
Charcoal Iron, com.	8½- 9	Superior Steel	41½- 45⅛
Charcoal Iron, pref.	6¾- 6½	Transue-Williams	45 - 45½
Chic. Pneu. Tool.	69 - 70⅞	Un. Alloy Steel	43½- 49⅝
Colo. Fuel	52 - 54⅞	U. S. Pipe, com.	22¼- 24¼
Cruc. Steel, com.	77 - 83¼	U. S. Steel, com.	126⅝-136⅝
Cruc. Steel, pref.	106 -110	U. S. Steel, pref.	118½-119¾
Deere & Co., pref.	97⅞	Va. I. Co. & Coke	66½- 68
Gen. Electric	162 -165½	Warwick	9 - 9½
Gt. No. Ore Cert.	33½- 36⅛	Westing. Elec.	53½- 56

Canadian Car Earnings

The annual statement of the Canadian Car & Foundry Company, Montreal, for the year ending Sept. 30, 1916, shows combined profits, after charging all expenditures for maintenance and renewals of plant and equipment of $1,292,105, compared with $321,849 the previous year. From the total is deducted provision for depreciation, $350,000, as well as interest on bonds outstanding and interest on debenture notes amounting to $588,849, leaving the profits for the year $353,256, compared with a deficit for the year ending 1915 of $558,471. Adding these profits to the surplus from the previous year of $1,073,798, the total surplus carried into the new year was $1,427,054. War munitions orders were the chief factors in operations during the year. Expenditures of approximately $779,000 were necessary to enable a company to successfully engage in this work. These have been charged against earnings, and the sum of $600,000 was written off in the year.

Dominion Steel Report

Two new directors were elected to the board of the Dominion Steel Corporation at a meeting of the board at Montreal, when the financial statement for the year ended March 31 last was submitted for approval. The new directors are J. K. L. Ross, Montreal, and Sir William D. Reid of Montreal and St. John's, Newfoundland. They will fill the vacancies left by the death of Robert Mackay of Montreal and of David Mackeen of Halifax. Dominion Steel Corporation's net profits in the record-breaking year ended March 31 last represented earnings at the rate of 26.71 per cent on the corporation's $32,097,000 common stock, according to the official figures, against 9.39 per cent earned in 1915-16, previously the best year in the corporation's history. Net earnings, after deducting all manufacturing, selling and administrative expenses and also after provision for amortization of munitions plant and equipment and business profits tax for 1915-16, were $12,967,874, an increase of $5,963,558, or 85 per cent over the preceding year, which was a record-breaker at the time. As compared with the best year prior to the war, 1912-13, the increase was $8,253,817, or approximately 180 per cent. Allowances for depreciation, sinking funds, etc., at $1,859,595 were some $667,000 higher than what had previously been set aside for this purpose.

Standard Screw Company's Report

The report of the Standard Screw Company for the year ending March 31, 1917, shows handsome earnings. The statement prepared by the late W. B. Pearson, president, says:

"The entire issue of debenture bonds has been paid off and cancelled. All contracts for foreign war material have been closed with satisfactory results. The large reserves set up for taxes are considered necessary due to the constant and varied levies, some retroactive. The company has a large amount of orders on its books, but they are almost exclusively confined to its regular lines and while satisfactory profits therefrom can reasonably be anticipated, a continuance of the past two years' exceptionally high earnings cannot be looked for."

The income account follows:

Combined net profit of companies owned, after making ample charge for repairs, renewals and replacements of plant and equipment and less expenses of Standard Screw Company	$7,514,575.59
From which deduct bond interest	8,100.00
Net income available for dividends	$7,506,475.59
Deduct dividends declared—6 per cent on A preferred, 7 per cent on B preferred and 149 per cent on common	3,896,289.00
Surplus for the year	$3,610,186.59
Previous surplus	2,639,289.83
Total, per balance sheet	$6,249,476.42

The Wm. Tod Company, Youngstown, Ohio, has filed notice of its intention to reduce its capital stock from $1,500,000 to $15,000. This is a step toward the dissolution of the company, which was taken over some months ago by the United Engineering & Foundry Company, Pittsburgh. The Wm. Tod Company operated a large foundry and machine shops at Youngstown, Ohio, for nearly 50 years, and acquired a wide reputation as builders of engines, rolling mill and steel works equipment, and other machinery. The company is now completing in its shops a very large plate mill for the Imperial Steel Company of Japan.

Dividends

American Car & Foundry Company, quarterly, 1 per cent and extra 1 per cent on the common, and quarterly 1¾ per cent on the preferred, all payable July 2.

American Rolling Mill Company, quarterly, 2 per cent and extra 3 per cent on the common, and quarterly 1½ per cent on the preferred, all payable July 15.

The William Cramp & Sons Ship & Engine Building Company, 3 per cent, payable Aug. 1.

The Dominion Foundries & Steel, Ltd., quarterly, 2 per cent on the common and 2 per cent on the preferred, payable June 1.

The Dominion Steel Corporation, Ltd., quarterly, 1 per cent on the common, payable July 2.

The La Belle Iron Works, quarterly, 3 per cent on the common, and 2 per cent on the preferred, payable June 30.

The Lackawanna Steel Company, quarterly, 1½ per cent and extra 2½ per cent on the common, payable June 30.

The Railway Steel Spring Company, quarterly, 1¼ per cent on the common, payable June 30, and 1¾ per cent on the preferred, payable June 20.

The Scovil Mfg. Company, extra 10 per cent, payable June 1.

The Yale & Towne Mfg. Company, quarterly, 2½ per cent, payable July 2.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; Structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in trans-atlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 4c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in thick, 6 in. up to 100 in. wide, 7c. base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.
Sketches not over four straight cuts, inc. straight taper .10
Sketches having more than four straight cuts .20
Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $90 to $95.

Wire Products.—Prices to jobbers, effective April 20: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $3.45; galvanized, $4.15. Galvanized barb wire and staples, $4.35; painted, $3.65. Wire nails, $3.50. Galvanized nails, 1 in. and longer, $2.20 advance over base price; shorter than 1 in., $2.70 advance over base price. Cement coated nails, $3.40. Woven wire fencing, 48 per cent off list for carloads, 47 off for 1000-rod lots, 46 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from May 1, 1917, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	42	15½	⅛ and ¼	30	3
½	46	31½	⅜	31	4
¾ to 3	49	35½	½	35	17
			¾ to 1½	38	22

Lap Weld

2	42	29½	1¼	23	8
2½ to 6	45	32½	1½	30	16
7 to 12	42	28½	2	31	17
13 and 14	32½	..	2½ to 4	33	20
15	30	..	4½ to 6	33	20
			7 to 12	32	19

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	38	20½	⅛, ¼ and ⅜	29	12
½	43	30½	½	34	21
¾ to 1½	47	34½	¾ to 1½	38	23
2 to 3	48	35½			

Lap Weld, extra strong, plain ends

2	40	28½	1¼	24	9
2½ to 4	43	31½	1½	30	16
4½ to 6	42	30½	2	32	19
7 to 8	38	24½	2½ to 4	34	22
9 to 12	33	19½	4½ to 6	33	21
			7 to 8	27	15
			9 to 12	22	10

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanzied steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe and five (5) points lower (higher price).

Boiler Tubes.—Nominal discounts on less than carloads, freight added to point of delivery, effective from Nov. 1, 1916, on standard charcoal iron tubes, and from April 2, 1917, on lap-welded steel tubes are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	31	1½ in.	23
2¼ in.	28	1¾ and 2 in.	35
2½ and 2¾ in.	34	2¼ in.	32
3 and 3¼ in.	34	2½ and 2¾ in.	38
3½ to 4½ in.	34	3 and 3¼ in.	42
5 and 6 in.	33	3½ to 4½ in.	No quotations
7 to 13 in.	30	5 and 6 in.	37
		7 to 13 in.	34

Above discounts apply to standard gages and to even gages not more than four gages heavier than standard in standard lengths.

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

[Open-hearth stock, $5 per ton above these prices.]

Blue Annealed—Bessemer

	Cents per lb.
Nos. 3 to 8	6.75 to 7.00
Nos. 9 and 10	7.00 to 7.25
Nos. 11 and 12	7.25 to 7.50
Nos. 13 and 14	7.50 to 7.75
Nos. 15 and 16	7.75 to 8.00

Box Annealed, One Pass Cold Rolled—Bessemer

Nos. 17 to 21	6.80 to 7.30
Nos. 22 and 24	6.85 to 7.35
Nos. 25 and 26	6.90 to 7.40
No. 27	6.95 to 7.45
No. 28	7.00 to 7.50
No. 29	7.05 to 7.55
No. 30	7.15 to 7.65

Galvanized Black Sheet Gage—Bessemer

Nos. 10 and 11	8.00 to 8.50
Nos. 12 and 14	8.10 to 8.60
Nos. 15 and 16	8.25 to 8.75
Nos. 17 to 21	8.40 to 8.90
Nos. 22 and 24	8.55 to 9.05
Nos. 25 and 26	8.70 to 9.20
No. 27	8.85 to 9.35
No. 28	9.00 to 9.50
No. 29	9.25 to 9.75
No. 30	9.50 to 10.00

Tin-Mill Black Plate—Bessemer

Nos. 15 and 16	6.80 to 7.30
Nos. 17 to 21	6.85 to 7.35
Nos. 22 to 24	6.90 to 7.40
Nos. 25 to 27	6.95 to 7.45
No. 28	7.00 to 7.50
No. 29	7.05 to 7.55
No. 30	7.05 to 7.55
Nos. 30½ and 31	7.10 to 7.60

MAKING OVER REVENUE BILL

Ten Per Cent Tariff Goes Out—Changes in Manufacturers' Taxes

WASHINGTON, June 5, 1917.—The Senate Finance Committee is putting the finishing touches on the war revenue bill, which will probably be reported to the Senate before the end of the present week. While all of its provisions are subject to change until the measure is actually taken into the Senate, it is believed that very few modifications will be made in the latest draft, which has already been approved by the Treasury Department. It is expected that two or three weeks will be devoted to the discussion of the bill in the Senate and that its provisions will be promptly agreed to in conference, the measure becoming a law soon after July 1. Revenue legislation will have the right of way in both Houses and plans are being made for final adjournment before July 15.

The revenue bill, as completed, fully redeems the prediction made when the measure passed the House that it would be entirely rewritten by the Senate Committee and that the changes would follow conservative lines. It is estimated to produce $1,460,000,000, or $400,000,000 less than the House bill, but it will probably carry a provision now under consideration authorizing the issuance of short-time Treasury certificates to the amount of $1,000,000,000 additional. As these certificates will be payable in ten years or less, the principle that 50 per cent of the cost of the war shall be paid for by the present generation will be adhered to, notwithstanding the fact that current taxation as planned by the House measure will be substantially reduced. It is obvious, however, that as these projected short-time notes must be taken up within the limit fixed by the bill, the greater part of the war-tax laws will have to be retained on the statute books until they are retired.

The provision of the House bill levying an additional customs duty of 10 per cent ad valorem on all importations, whether free or dutiable, has been definitely abandoned by the Senate Committee, and it is believed the House will concur in this action. The decision of Chairman Simmons and his colleagues to drop the tariff provisions was reached only after much deliberation and extended conferences with Professor Taussig and other members of the recently appointed Tariff Commission. The members of the committee are fully convinced that disastrous consequences to the interests of the country would follow the adoption of a flat war duty applicable both to raw materials and finished products, and after a futile attempt at devising a list of exempted commodities and compensatory duties on articles in which the labor cost is a dominating factor, the entire House project was rejected. Inasmuch as the abandonment of the tariff duties involves the loss of more than $200,000,000 in revenue, the committee deemed it necessary to provide a partial offset and has therefore adopted a schedule of consumption taxes on four articles of almost universal consumption, namely, sugar, ½ cent per pound; coffee, 2 cents; cocoa, 3 cents, and tea, 5 cents. The Treasury Department is now working out the details of a plan for the assessment and collection of this tax.

About the only important provision of the revenue bill as to which there is still some doubt is that taxing excess profits, which is being worked out by a subcommittee assisted by Treasury experts. It has been practically determined to adopt the English plan of fixing the basis of this tax, which will be the difference between current profits and those made during certain years before the war. The committee has been somewhat perplexed in dealing with this phase of the subject to learn that there are many large corporations now making substantial profits out of war business, which have been organized since August, 1914, and which, therefore, have no comparative financial history. The committee has also received appeals from a number of large corporations which made very small profits, or none at all, during the three years before the war. Some more or less arbitrary basis may be devised to meet these cases.

A provision of the Senate bill repeals the existing law imposing a tax of 12½ per cent upon the profits of munitions makers. This action is proposed because of the change in the basis of the excess profits tax and because the committee feels there was some injustice in the original imposition of this tax. Its elimination will also do away with the vexatious question as to the proper treatment of corporations which may be engaged exclusively or largely on contracts for the American Government.

W. L. C.

Lake Ore Shipments in May

Iron ore shipments from the Lake Superior region in May were over 25 per cent less than in May, 1916. The total last month was 6,283,612 gross tons, as compared with 8,449,580 tons in May, 1916, a decrease of 2,165,988 tons, or 25.83 per cent. The comparative shipments by ports for May this year and for the season were as follows, in gross tons:

	May, 1916	May, 1917	To June 1, 1916	To June 1, 1917
Escanaba	1,045,186	1,105,086	1,443,400	1,295,493
Marquette	561,555	98,048	614,813	98,048
Ashland	955,041	732,951	1,102,893	732,951
Superior	1,722,341	1,383,294	1,933,681	1,404,419
Duluth	2,671,044	1,765,683	3,209,325	1,765,683
Two Harbors	1,494,413	1,198,550	1,803,879	1,198,550
Total	8,449,580	6,283,612	10,107,991	6,495,144
Decrease, 1917		2,165,968		3,612,847

The decrease to June 1, 1917, from last year is 35.74 per cent. The Duluth and Superior percentage of the total to June 1 this year was 48.81 against 50.90 per cent last year, but the Escanaba proportion is higher this year at 19.94 per cent, against 14.27 per cent last year and only 9.59 per cent to June 1, 1915.

Shipments in May this year were greater, however, than in May, 1915, when they were 5,012,359 tons.

S. T. Wellman and Ambrose Swasey Honored

The Cleveland Engineering Society, Cleveland, has elected the following officers for the ensuing year: J. H. Herron, metallurgist, president; E. B. Thomas, consulting engineer, vice-president; and F. B. Richards, city bridge engineer, George Merryweather, Motch & Merryweather Co., machinery dealer, and F. A. Vaughan, assistant factory superintendent, National Carbon Company, directors. Action has also been taken making two distinguished members of the society, S. T. Wellman, prominent in the steel industry, and Ambrose Swasey, president of the Warner & Swasey Company, machine-tool builder, honorary members of the society, of which both are past presidents. This honor will be conferred upon Mr. Wellman and Mr. Swasey June 12, when the new officers will be installed.

For Repairing Motor Trucks in the Field

The quartermaster general of the army, Washington, D. C., has issued specifications, with a request for estimates, on machine shop equipment for repairing motor trucks in the field service of the quartermaster corps. The outfit includes a gasoline electric generating set for furnishing current for electric motor-driven machine tools, and for electric lighting, also a 13-in. screw cutting lathe, 18-in. drill press, portable forge, and a large assortment of machinists' and blacksmiths' small tools.

The United States Geological Survey has published a report on the zinc resources of each zinc-producing State in the United States, accompanied by a map showing the location of zinc-producing districts, zinc smelters, electrolytic zinc plants and zinc oxide plants, and by tables showing the production for several years. An interesting tabulation gives the individual output of the principal zinc-producing districts. Brief summaries are also given of the zinc resources and zinc-smelting capacity of the foreign countries whose product now competes with that of the United States. A copy of this report may be obtained by addressing the United States Geological Survey, Washington, D. C.

VARYING COMPENSATION LAWS

National Industrial Conference Board Points Out Inconsistencies

BOSTON, June 5, 1917.—Endorsement of the underlying principle of workmen's compensation laws, and constructive criticism of their practical application, are the chief features of a report on "Workmen's Compensation Acts in the United States—The Legal Phase," just issued to-day by the National Industrial Conference Board, M. W. Alexander, secretary. The vital principle of workmen's compensation is set forth as "the substitution of a definite and certain measure of relief for the former uncertainties of redress through litigation." Workmen's compensation supplants the old system by which expensive and tedious litigation was necessary to prove who was at fault for each industrial accident; the new system provides a workable plan by which limited but certain wage payments are promptly made to injured employees. It ignores the question of fault of any one except where it is clearly wilful, and classes industrial accidents as necessarily incidental to industrial activity. Compensation acts thus aim to meet a public necessity, not to redress a private wrong. The report commends the new principle as in line with the best conceptions of equitable industrial relationships. Some of the data presented are the following:

Thirty-seven States and four territories of the United States now have compensation laws, and a federal compensation act for civilian employees was adopted in September, 1916. The compensation principle now applies to more than two-thirds of the wage earners in the United States.

Classes of Workers Excluded

The laws of the various States reveal curious and glaring inconsistencies. West Virginia, Michigan and California exclude traveling salesmen from compensation benefits. Minnesota includes them only if employed by a Minnesota employer. New Jersey includes them while in the State, even though they are not residents. Domestics and casual laborers are usually excluded. In numerous industries, particularly agriculture, compensation acts do not apply to the small employer. The effect of this is to exclude a considerable proportion of the country's workers from the benefits of these acts. Agricultural labor is specifically included under compensation legislation by only one State, New Jersey; in 23 States it is specifically excluded.

In 8 States workmen's compensation acts are compulsory upon the employer. In 24 States he has an election; but if he does not accept he must forfeit some or all of his common-law defenses in any action brought by or in behalf of his injured employee. In 23 of these 24 States the employee likewise has an option; in Texas, he is bound by his employer's choice. In 15 States acceptance by both employer and employee is presumed unless either definitely rejects; in several States there must be a formal notice of acceptance.

In 25 States the employer affected by compensation acts must either insure his liability or demonstrate his financial capacity for self-insurance. In several States contribution to a State insurance fund is obligatory.

Classification of "hazardous" occupations is very uncertain in the various acts. Although private insurance experience shows many forms of agricultural employment to be more dangerous than mechanical trades, agriculture is nowhere designated by compensation acts as a "dangerous" or "hazardous" occupation.

"Accident" Variously Defined

Another source of conflict lies in the significance given to the term "accident." In the English compensation act, largely used as a basis for American legislation, the liability is expressed by the phrase "personal injury by accident arising out of and in the course of employment." In the compensation acts of 14 States this language is followed identically; in others, the words "by accident" are omitted, thus broadening the liability; in some cases, the words "out of" are also omitted, further extending the liability to cover injuries received in the course of employment, although the occupation had no direct connection with the injury. For instance, the Ohio Industrial Commission awarded compensation to the dependents of a stenographer because, while taking dictation from her employer, she was murdered by a jealous suitor; the New York Industrial Commission awarded compensation for the death of a street railroad process server from gangrenous diabetes alleged to have resulted from having his toes trodden upon by a fellow passenger in a street car of the company which employed him.

In this country "occupational diseases" as a rule are not included under the term "accident" in workmen's compensation acts, but in the administration of these acts an increasing tendency to include many forms of diseases contracted during employment is evident.

The decisions of the Supreme Court of the United States in three important cases involving workmen's compensation acts are carefully analyzed in the report. These have afforded a searching legal test of the fundamental principle involved. As a result it is concluded that "the general powers of a State to enact compensation legislation are no longer open to question." The Supreme Court of the United States also has maintained the power of a State to compel contributions by employers to a State accident fund.

The report ascribes the dissimilarities partly to wrong conceptions of the underlying principle of workmen's compensation, but more largely to the influences set up by local tradition, local phraseology, varied political and social conditions, and, in some States, to constitutional limitations.

Several important constructive suggestions are submitted:

1. That the various States, in order to reduce existing conflict and uncertainty, immediately undertake to establish a permanent, scientific and uniform system of compiling accident statistics. This would be a great step toward determining definite standards of liability and equitable compensation rates, and would enable legislators to judge the real hazards of various occupations and "permit the just extension of the compensation principle to many workers now arbitrarily excluded from its terms."

2. Clear distinction in statutes between the terms "occupational disease," "accident" and "injury."

3. Direct settlement of claims between employer and employee, the interests of the employee to be properly safeguarded.

4. An exclusively compulsory system of compensation is endorsed on the ground that it would eliminate many technical uncertainties.

This report on the legal phase of workmen's compensation acts is to be followed by other reports on the medical, economic and administrative phases. The National Industrial Conference Board is also conducting investigations of various other industrial problems on which reports will be issued from time to time.

Increase in Shipbuilding Work, 600,000 Tons

WASHINGTON, June 5, 1917.—The total merchant construction in American shipyards, including completed and undelivered vessels under contract with all persons, corporations or governments other than the United States, on May 1, 1917, was 537 steel ships of an aggregate tonnage of 2,039,261 tons and 167 wooden ships of 214,753 tons, according to a statement transmitted to the Senate on the 1st inst. by Vice-Chairman Brent of the United States Shipping Board. These figures do not include any contracts let by the board for the Emergency Fleet Corporation. On May 1, 1916, the construction in progress in the American yards included 368 steel ships of a total gross tonnage of 1,129,014 tons. Wooden ships were not reported. These figures, which show an increase in total steel construction on hand of nearly 100 per cent over that of the corresponding date a year ago, are of special interest for the reason that the Bureau of Navigation, in accordance with an order issued by the President, suspended, early in the present year, the monthly publication of statistics regarding the shipbuilding industry. The total increase in the amount of work on hand since Jan. 1 of this year is nearly 600,000 tons. W. L. C.

TIN ROOF ADVERTISING

One of the Topics Discussed by Metal Branch of National Hardware Association

On Friday and Saturday, June 1 and 2, members of the Metal Branch of the National Hardware Association met in the William Penn Hotel, Pittsburgh. This organization is composed of jobbers in sheets, tin plate and general metal products. About 70 or more of the leading jobbers were present, coming from as far as Seattle and San Francisco.

It was the concensus of opinion of the jobbers that the war is going to create an abnormal demand for sheet and tin mill products. Mention was made of the heavy orders for sheets for various Army accessories already placed and of the demand for tin plate for packing other foods for the Army. It was the general opinion that the demand for tin plate has not been curtailed by the high prices ruling, but on the contrary the pack of fruits, vegetables and meats this year will be the heaviest ever known, largely due to the war conditions. A marked falling off in the demand for terne plate for roofing purposes was noted. Jobbers present reported that the demand for roofing tin in nearly all sections was practically dead, this being due partly to the high prices.

C. J. Riter, Riter Brothers & Co., Philadelphia, spoke on the cost of doing business. A chart was displayed in the meeting room, showing that one leading jobber reported a cost of only 8.35 per cent for doing business in a given period, while another jobber reported a cost of more than double this amount. It also developed in the discussion that a certain Southern jobber was recently selling galvanized sheets from store at 6.50c. per 100 lb.

Advertising Campaign on Terne Plate

A national advertising campaign on terne plate was advocated by many of the jobbers, to be inaugurated as early as possible, and to involve $250,000 to $300,000 to be spent annually by the manufacturers and jobbers in exploiting the merits of tin roofing over other forms of roofing now in the market. It was pointed out that manufacturers of prepared roofings are keenly alive to the situation and are advertising heavily and getting good results. It was suggested that the Metal Branch should co-operate closely with the National Association of Sheet and Tin Plate Manufacturers, who also have under consideration a national advertising campaign for sheets and tin plate and metal products, particularly for terne plate roofing. It seems likely that a committee from the Metal Branch will be appointed in the near future, to co-operate with a similar committee from the National Association of Sheet and Tin Plate Manufacturers regarding its proposed national advertising campaign.

There was some difference in opinion as to how the cost of this advertising campaign should be met, whether it should be paid for entirely by the manufacturers, or whether the jobbers should contribute a part. The matter was disposed of in a resolution to the effect that the Metal Branch of the National Hardware Association is in hearty sympathy with the manufacturers of sheet metal products for a national advertising campaign, and that the jobbers are willing to co-operate to the fullest extent, both financially and in any other way possible.

The Metal Club in Philadelphia was taken as an example of the benefits to be derived by advertising. The metal jobbers in Philadelphia organized the Metal Club some months ago, and an advertising campaign gave splendid results. Similar clubs, it was suggested, will be organized in other large cities that have a sufficient number of jobbers in sheet metal goods to warrant doing so.

Sales Conditions Among Jobbers

F. A. Schoedinger, Columbus, Ohio, discussed the changes in buying and selling resulting from present conditions. Many jobbers, he said, now find they sold ahead too far at prices ruling some time ago, and are getting slow deliveries from the mills; while, on the other hand, many jobbers did not buy heavily enough and are unable to supply their trade promptly. He suggested that great care should be taken in making sales in the future, owing to the very high prices ruling on sheet metal products, notably galvanized sheets. He stated that on some contracts taken some time ago by roofers, on which they were not covered on the raw materials, they would probably complete these jobs at a loss, and that it was the duty of every jobber to restrict, to some extent, purchases of customers. He said that as a rule many customers of jobbers are not posted on market values, and are taking contracts below cost of materials and labor. Labor has to be paid regularly, but when it comes to settling with the jobbers there may be trouble in collecting accounts of this kind. Mr. Schoedinger considered it the duty of the jobbers to sell any metal wanted by the Government at a small profit.

On Friday evening a subscription dinner was given in the William Penn Hotel. Louis Follet, Standard Tin Plate Company, Canonsburg, Pa., was toastmaster, and the principal address, entitled "Our Problems," was made by Col. H. P. Bope, vice-president and general sales manager of the Carnegie Steel Company, Pittsburgh.

Chairman W. H. Donlevy mentioned that the annual meeting of the National Hardware Association will be held at Atlantic City, N. J., in October, and that an entire afternoon would be devoted to a session of the Metal Branch.

At the Saturday morning session, the Morton Metal Mfg. Association, Wichita, Kan., the David Lupton's Sons Company, Philadelphia, and the Charles H. Connor Company, Louisville, Ky., were admitted as members.

Electric Steel in Great Britain

Criticizing the official report of the British Iron, Steel and Allied Trades Federation, giving Great Britain's steel output in 1916, the London *Ironmonger* claims that the figure of 30,000 tons, as representing the British output of electric ingots in 1916 is absurdly below the mark, considering the numerous furnaces producing steel by that process last year. It continues: If the figure were doubled, the result would probably be less than the reality, allowing for plants which are employed on castings. In fact, this part of the statistics, we believe, is not seriously defended by the compilers, who admit that the returns received from the electric steel melters were very incomplete. Here again the development since the close of last year promises to outstrip all former advances. The electric furnaces of Sheffield alone can now produce 90,000 tons a year, and those that have been ordered will bring up the total capacity of the district to 150,000 tons in 1918.

Japan Now a Large Producer of Tungsten and Antimony

Japan is rapidly becoming a large producer of important metals. Official estimates of some of these for 1916 are given as follows, compared with 1915:

Ore	1915, Pounds	1916, Pounds
Antimony	18,490,615	27,333,333
Molybdenum	24,733	74,167
Tin	759,325	562,666
Tungsten	827,950	1,358,333

Practically all of the tungsten and antimony was exported.

Corrigan, McKinney & Co., Cleveland, started up one of their new open hearth furnaces June 1 and plan to place another in operation July 1 and the two remaining about July 15. With the completion of these units the firm will have in operation 16 75-ton open hearth furnaces.

Plans have been filed at Chicago for the construction of a new blast furnace for the Iroquois Iron Company, announcement of which was made several weeks ago. Freyn & Co. are the architects and engineers.

PERSONAL

Frederick W. Sinram was elected president and F. D. Hamlin, secretary, of the American Gear Manufacturers' Association at its recent annual meeting in Pittsburgh. Mr. Sinram is secretary and treasurer of the Van Dorn & Dutton Company, Cleveland, and Mr.

F. W. SINRAM

F. D. HAMLIN

Hamlin is vice-president of the Earle Gear & Machine Company, Philadelphia. A number of new members were added to the association and it is believed it will soon embrace practically all the leading gear makers of the country. The association has been organized for the purpose of developing, standardizing and improving all products of the gear industry. In view of the present national situation, the recent convention will undoubtedly have an important bearing on the efforts being put forth by the Government for standardization in all lines of manufacture. The association stands in an important relation to the automobile trade since the products of the membership have gone far toward placing automobile manufacture in its present high position.

E. W. Wingerter, formerly with the Doermann-Roehrer Company, Cincinnati, has joined the sales force of C. M. Bigger, manager of sales, Vanadium Alloys Steel Company, with headquarters at Cincinnati.

Arthur Letherby, formerly president of the Kern Machine Tool Company; Hamilton, Ohio, is traveling for the machinery department of E. A. Kinsey Company, Cincinnati.

H. B. Pickering, formerly connected with William Cramp & Sons Ship & Engine Building Co. and the New York Navy Yard, is now with the Foundation Co., Woolworth Building, New York, in the capacity of naval architect and marine superintendent.

W. A. Wetmore, after active service with the Colorado Fuel & Iron Company for over 35 years, resigned June 1 as division sales agent at San Francisco and has retired from business. Mr. Wetmore is widely known in the western iron and steel trade. He went to the Pacific coast in 1900. Prior to that he served the Colorado Fuel & Iron Company as assistant general sales agent at Denver and as general agent at Salt Lake City. He started with the company as a clerk in Denver in 1881. President Welborn in announcing Mr. Wetmore's retirement said: "Mr. Wetmore is the first one occupying an official or semi-official position to avail himself of the privilege of our service retirement plan recently adopted, and the announcement of his surrender of active participation in the company's affairs is made with keenest regret, yet with satisfaction that under the provisions of retirement his relations with the company will be continued." Owing to the retirement of Mr. Wetmore, H. E. Stuard has been transferred to San Francisco as division sales agent; Thomas Aurelius from Pueblo to Denver as assistant manager of sales, succeeding Mr. Stuard, and E. E. Hartwell has been appointed assistant manager of sales, with offices in Denver.

W. A. WETMORE

The appointment of F. H. Tackaberry as traveling representative for the American Steel Export Company, was mentioned a few weeks ago in this column. He takes the title of general agent and his first trip will be to South America, Brazil being his immediate objective and Rio de Janeiro his first base of operations. It is expected that Mr. Tackaberry's duties will require his visiting the different agents of the company in different world trade centers. At the time of the outbreak of the disturbances in Mexico he was the representative of the Pennsylvania Steel Company in Mexico City and later became the assistant general manager of sales for that company at Philadelphia. He has recently been associated with the Ordnance Engineering Corporation, New York, and occupied executive positions with the Industrial Underwriters, Inc., and the Locke Steel Belt Company.

Charles Whiting Baker has established offices as consulting engineer at 31 Nassau Street, New York.

H. Alan Ford, Lehigh University, '10, has resigned as steam engineer at the Bethlehem Steel Company, South Bethlehem, Pa., and has gone to Sault Ste. Marie, Mich., where he becomes assistant superintendent of the Union Carbide Company's plant.

Ralph S. Lane, chief engineer of the Hyatt Roller Bearing Company in Detroit, has resigned to devote his time to the operation of the Bearings Service Company and United Motors Service, Inc. Mr. Lane is president of both of these companies.

R. E. Wells, formerly chief engineer of the American Gear & Mfg. Company and more recently assistant engineer with the Hupp Motor Car Corporation, became engineer of the motor car division of the Hyatt concern May 1.

Louis O. Trubshaw, Milwaukee, superintendent of erecting engineers, Vilter Mfg. Company, Milwaukee, and son-in-law of Theodore O. Vilter, president of the company, has been called to service at Fort Sam Houston, Tex. Mr. Trubshaw enlisted in the quartermaster officers' reserve corps six months ago and holds the rank of captain.

Ross E. Willis, chief clerk of the merchant mill department of the Bethlehem Steel Company, Steelton, Pa., has been appointed an inspector in the ordnance department of the Government, with headquarters at Washington, effective June 1.

Henry S. Grove has resigned as president of the William Cramp & Sons Ship & Engine Building Company, Philadelphia, and has been made chairman of the board of directors. H. W. Hand, who had been vice-president and general manager, was elected president. H. B. Taylor was chosen vice-president and J. K. Mull general manager and director.

Ambrose Swasey, president of the Warner & Swasey Company, Cleveland, was elected president of the Cleveland Young Men's Christian Association at the annual election, June 1. He has been very active in the association and has been its first vice-president for several years.

James Gibbons, formerly manager of the Baltimore office of the Van Dorn Electric Tool Company, Cleveland, has been appointed manager of a branch office just opened by this company at 524 Wells Building, Milwaukee, Wis.

F. T. Coup, formerly connected with the Chicago office of the Wagner Electric Mfg. Company, St. Louis, has been appointed to take charge of the company's Milwaukee office in its new location, the First National Bank Building.

John N. Allen has been appointed manager of the mining and transportation departments of the Brier Hill Steel Company, Youngstown, Ohio. He succeeded John E. Perry, for some years with the Republic Iron & Steel Company, later for a very short time with the

Brier Hill Steel Company and recently elected president of the Wharton Steel Company, Philadelphia. J. R. Stroh has been appointed assistant general manager of the mining and transportation department of the Brier Hill Steel Company, a newly created position. Mr. Stroh has been with the Brier Hill Steel Company for about five years and will be associated with J. N. Allen, general manager of mining and transportation.

The appointment of Thomas J. Dillon as general manager of the Canada Foundries & Forgings Company, Welland, Ont., has been announced. Mr. Dillon has been in charge of the Billings & Spence and Canada Forgings plant at Welland, but in future he will have charge of the James Smart Mfg. plant at Brockville, Ont., as well.

Howard C. Marmon, president of the Nordyke & Marmon Company, Indianapolis, manufacturer of automobiles and flour milling machinery, has been appointed to the head of the motive power branch of the military department which, heretofore a part of the signal corps, will be organized as a separate unit of the war department. He will direct the manufacture of aeroplane motors in the United States. He has already been ordered to France on an inspection trip of factories there.

R. J. Kaylor, manager of publicity, Youngstown Sheet & Tube Company, Youngstown, Ohio, entertained members of the office force and their families with a talk on steel making at the public library at Youngstown, Ohio, Monday evening, May 28. The pictures presented by Mr. Kaylor showed the different processes of making steel from the ore up to the finished product.

Prof. Edgar Marburg, University of Pennsylvania, secretary-treasurer of the American Society for Testing Materials, has been ordered by his physicians to take a complete rest for several months.

Charles S. Thomas, who has been vice-president and secretary of the Deforest Sheet & Tin Plate Company, Niles, Ohio, has been elected president, succeeding Wade A. Taylor, who desired to be relieved of active direction of the company's affairs. Mr. Thomas will also act as treasurer. Charles W. Martin, formerly general superintendent, has been elected vice-president. Myron C. Summers has been elected secretary. The directors are: Charles S. Thomas, Wade A. Taylor, G. P. Gilmer, D. Strickland, C. W. Martin, W. H. Pritchard, F. W. Stillwagon, C. H. Stewart and M. C. Summers.

The Carwen Steel Tool Company, Charleston, W. Va., announces that Charles S. Butler, advertising manager of the Hess Bright Mfg. Company of Philadelphia, and C. F. Varoon, formerly chief production engineer of the Greenfield Tap & Die Corporation of Greenfield, Mass., have been appointed sales manager and superintendent of manufacturing, respectively, of the Carlson-Wenstrom Company, subsidiary of the Carwen Steel Tool Company.

Henry F. Russell, formerly with the Lumen Bearing Company, has been appointed sales manager of the gray iron foundry department of Farrar & Trefts, Inc., both at Buffalo.

J. F. Hedges, formerly secretary and treasurer of the Superior Steel Corporation, has resigned and has been succeeded by B. H. Forster, formerly assistant secretary and assistant treasurer of the American Iron & Steel Mfg. Company, Lebanon, Pa. P. P. Reese, formerly of the Timken Roller Bearing Company, Canton, Ohio, has been made works manager. The company has opened downtown offices in rooms 523 to 530, Union Arcade Building, Pittsburgh.

William R. Phillips, for the last three years manager of the Eastern division of the Austin Company, Cleveland, engaged in the erection of various kinds of industrial plants and factory buildings, has opened an office in the Newfield Building, Bridgeport, Conn., and will conduct a similar business for himself in New England only.

W. P. Snyder, Jr., vice-president of the Shenango Furnace Company, has been elected a director of the Pittsburgh Trust Company, to succeed his father, who has held that position for many years, and has been very active in the affairs of the Pittsburgh Trust Company. W. P. Snyder resigned his position as director owing to the heavy calls on his time by his manufacturing and shipping interests. The Board of Directors of the Pittsburgh Trust Company adopted a resolution setting forth the value of the services of Mr. Snyder as a director for many years past, and expressing regret at his retirement.

Taylor Allderdice, second vice-president of the National Tube Company, Pittsburgh, has been elected a director of the Chamber of Commerce of that city.

Robert Garland of the Garland interests at Pittsburgh has been re-elected president of the Pittsburgh Chamber of Commerce.

M. F. McWilliams, 925 Sheridan Avenue, Detroit, has been appointed district representative in that city for the distribution of the Electromobile industrial trucks and tractors manufactured by Orenstein-Arthur Koppel Company, Koppel, Pa.

Dr. Allerton S. Cushman, president of the Institute of Industrial Research, Washington, has been commissioned a major in the Officers' Reserve Corps, and will do special research work under the ordnance section on the chemistry of high explosives and munitions steel.

J. C. Hoot, for several years purchasing agent of the Illinois Steel Company, Chicago, has resigned. He will be succeeded by C. H. Rhodes, who comes from the Canadian Steel Corporation.

Charles C. Cluff, sales manager of the New York office of the Carnegie Steel Company, was chairman of a committee in charge of an outing which was given on June 5 under the auspices of the Long Island Automobile Club to some 1500 orphans of various institutions of Brooklyn.

Isaac W. Frank has been elected chairman of the board of directors of the United Engineering & Foundry Company, Pittsburgh, succeeding Charles H. Booth, who resigned recently on account of ill health. Mr. Frank is also president of the company.

G. E. Land has been appointed advertising manager of the Blaw Steel Construction Company, Hoboken, Pa.

An Aluminum-Iron Alloy

An aluminum alloy containing iron is claimed by its patentee, Albert W. Morris, Springfield, Mass. (U. S. 1,227,174—May 22, 1917), to possess these unusual properties: Attainment of the full chilling effect by the mold or die reduction of the shrinkage of the castings or forgings, removal of the danger of cracking of the metal, and an increase in the density and physical properties. The general opinion that iron is detrimental to aluminum castings or forgings, tending to make them brittle, is considered wrong, and it is stated that iron properly alloyed materially improves the product. The percentage of aluminum should not be less than 70 per cent, and that of iron should not be more than 6 per cent nor less than 1 per cent. The silicon content should be kept as low as possible. Other metals such as zinc, copper, nickel, cadmium, magnesium or manganese may be present. Special importance is attached to the new alloy in the manufacture of fuses and detonators for explosive shells since its density is such as to prevent leakage through it of gases which might cause premature explosion of the shell.

The Sangamo Electric Company, Springfield, Ill., announces the opening of a San Francisco office at 37 Stevenson Street, in charge of L. A. Nott, district manager, who will represent the company in Northern California and that part of Southern California not handled by its Los Angeles office. Mr. Nott was for many years with the Standard Underground Cable Company, and latterly with the K. P. F. Electrical Company, which association he will continue.

The Pyro Ignition Co., Inc., New York, has leased a 3-story plant in Reading, Pa., and will manufacture spark plugs.

Navy Yard Building Program of $80,000,000

Structural and Machine Shops and Foundries of Unprecedented Size — Buildings Going Up in Months Usually Requiring Years

WASHINGTON, June 5, 1917.—The Navy Department is now carrying through at an estimated expense of more than $80,000,000 a building program in the improvement and extension of navy yards, training stations, aviation stations, submarine bases, the erection of immense storage warehouses for supplies of munitions, the construction of dry docks capable of accommodating the largest vessels, gun shops, including the erection at the naval gun factory of the largest gun shop of the kind in the world, and hundreds of buildings for the various branches of the service, according to an official statement made public yesterday by Rear Admiral F. R. Harris, chief of the Bureau of Yards and Docks, who is in charge of the work and who is assisted by a corps of civil engineers of the Navy and a large force of trained civilian engineers, designers, inspectors and experts. The statement is in part as follows:

Navy Yard Rebuilding

"The improvement program amounts to the practical rebuilding of some of our navy yards and stations. This undertaking, which is well under way and in some cases nearing completion, provides building ways, shops, tools, cranes and all of the requisite appurtenances, destroyers, submarines, scout cruisers, gunboats and auxiliaries. Besides this, by indirect supervision and assistance, the warship building facilities of the large private plants have been increased, in some cases such assistance extending to the enlargement of shops and an increase in producing facilities at some of the large electric, steel and ordnance plants of the country. Remodeling and enlargement of all the power plants at the stations are well in hand and in nearly all cases under contract and arrangements made for carrying out the plans long ago perfected so as to 'tie in' these various important Government plants with industrial sources of power in their vicinity.

"As an example of the scope of the work, more than $10,000,000 is involved in providing immediately storage space for provisions, supplies and ammunition. In many cases such storage will be permanent and at the New York Navy Yard, for instance, we are building a storehouse which will be the largest single building of the kind in the United States. This is now under way and will be completed within five months. This storage program for supplies and munitions involves the construction of magazines, shell houses, torpedo storage, mine storage, nitrate storage, in all requiring over 200 buildings.

"The shore work of the Navy under way involves the building of the largest and heaviest gun shop in the world and of shops for the complete production of torpedoes, mines and optical instruments, besides projectiles and powder.

Unprecedented Shipbuilding Facilities

"The shipbuilding facilities under way contemplate provision for the construction of the largest warships ever built. This involves the provision of structural shops, machine shops and foundries of the most modern type, some of them heretofore unprecedented in size. The machinery for these buildings is most unusual in character. The crane service is a large step in advance of anything heretofore contemplated. Traveling cranes, having a capacity as high as 300 tons, are being built, while fitting-out cranes with a capacity of nearly 400 tons are planned. The largest cranes of such character ever before built, and these for England and Germany, are only 300 tons.

"The program includes the construction of two dry docks capable of taking the very largest vessels. Both of these are well under way. Arrangements have been perfected for expediting their construction so that it is hoped they may be completed and ready for use in about one-quarter of the time that has heretofore been taken for the construction of smaller docks.

"For the purpose of communication new radio stations have been built along the coast all the way to Alaska and also in our island possessions. Fuel storage depots for the storage of oil, so essential to the fleet, have been planned and in many cases are under construction. Supply depots, magazines, gun shops, powder and projectile plants, barracks, training schools and camps, marine corps depots, fuel stations for coal and oil, rifle ranges for target practice, hospital pavilions and medical supply stations are among the large variety of new buildings provided.

Construction of Years in Months

"A building program of this magnitude, involving some $80,000,000, is usually distributed over a term of years, but this construction is being carried out on an unprecedented scale. Many of the camps, warehouses, etc., are already completed, others will be done in a few weeks and most of the building that would ordinarily have taken three or four years will be finished within nine months.

"Some idea of the construction work being done by the Navy Department can be gained by the mention of some of the many improvements now under way:

New York Navy Yard.—About $5,000,000 being expended on new ways for building the largest ships; the largest storage warehouse in the country; doubling machine shops, erecting new structural shops and other shops and buildings.

Philadelphia, League Island.—New dry dock 1000 ft. long, which will be able to accommodate the largest ships; two new ways for shipbuilding; new structural and machine shops, pattern shop and the largest foundry on the Atlantic coast; barracks for Marine Corps and other auxiliary buildings. The total expenditure involved will be about $18,000,000.

Norfolk Navy Yard.—Dry dock 1000 ft. long, capable of accommodating the largest ships; new structural and machine shops and foundry; water-front and other improvements, including barracks and other buildings, involving a total expenditure of nearly $20,000,000.

Washington.—Naval gun factory being expanded into one of the largest plants of the kind. Total expenditures about $7,000,000. New gun shop being erected, which will cost about $2,000,000.

Mare Island, Cal.—Navy Yard being equipped to build the largest type of battleships. Camp for 5000 men being erected.

Puget Sound, Washington.—Three million dollars being expended in facilities for building cruisers and various types of auxiliary vessels, erecting storehouses and other necessary buildings.

"Other developments include the Great Lakes Training Station, Chicago, which is being expanded so that it will eventually provide for 20,000 men. A new aviation station has been constructed at Pensacola, Fla.,

with hangars, dirigible shed, launching sheds and other necessary buildings. The new camp at Port Royal, S. C., for the Marine Corps, accommodating 5000 men, has been completed, as have also the barracks at Charleston, S. C., for 5000 men. The new camp and training station at Quantico, Va., which will accommodate 10,000 marines, is well under way. Various improvements have been made at the navy yard at Portsmouth, N. H.; at Newport, R. I.; Boston, New Orleans and other points. Hundreds of magazines, storehouses, barracks, hospital pavilions and medical storage houses have been erected or are under construction in the various naval districts. Work is going steadily forward on the big base at Pearl Harbor, Hawaii, and on the 1000-ft. dry dock there." W. L. C.

Government Contracts Placed and Pending

The Government has asked for bids on about 21,500 cast iron projectiles. These run from 3 in. to 6 in. in diameter, but 10,000 of them, 3 in. in diameter, will be solid shot. The indications are that all this material is intended for practice shooting. All told, about 300 tons of cast iron is involved.

The War Department, which has recently received bids, is expected to close a contract for 1,400,000 high explosive 3-in. shells at $10.50 each to T. A. Gillespie Company and 1,000,000 3-in. shells to the Bethlehem Steel Company at $10.55 each. The Gillespie contract will call for 10,500 tons of steel forgings and the steel will probably be furnished by the Carnegie Steel Company. The Bethlehem order calls for 7500 tons of steel, which will be furnished by its own mills.

The American Can Company is expected to receive the award for 1,000,000 3-in. shrapnel rounds at $10.51 each, requiring 7500 tons of steel. The Eddystone Munitions Company will furnish 750,000 shrapnel rounds at $10.57 each, calling for 5625 tons of steel rounds, and Bartlett Hayward will furnish 500,000 shrapnel rounds at $10.58 each, requiring 3750 tons of steel.

Other contracts for high explosive shell steel bodies include 1,500,000 to the S. A. Wood Mfg. Company at $3.81 each, requiring 7500 tons of steel; the Westfield Mfg. Company, 300,000 shell bodies at $4 each, calling for 1500 tons of steel, and the Consolidated Car Heating Company, 300,000 shell bodies at $4 each, also requiring 1500 tons of steel. T. H. Symington & Company have received an order for 2,000,000 shrapnel bodies at $3.75 each, requiring between 7500 and 10,000 tons of steel.

German Steel Prices Advanced

The Prussian Minister of Railways has granted to iron and steel works a war price increase of 50s. per ton over the contract prices, arranged in June, 1916, for a period of three years, according to German newspapers quoted by the London *Iron and Coal Trades Review*. The basis price for heavy rails was then fixed at 129s. per ton, as compared with 114s. in 1914, and the war price increase has been conceded in view of the advance in costs since then. The recent increase of 40s. per ton in the quotations for semi-finished steel having stimulated the demand for equivalent advances in the prices for finished products, the German Government has issued a statement emphasizing the undesirability of this movement and has taken steps to prevent a general increase. In the meantime, except in the case of plates, official sanction has been provisionally withheld from the advances which had been decided upon by the various price conventions. For the rest the maximum prices in general are under strict control.

The Nagle Steel Company, Pottstown, Pa., has now got into operation at its Rahway, N. J., steel works one of the basic open-hearth steel furnaces and expects to have another furnace in operation by the latter part of June or early in July. The company is there producing slab ingots which are shipped to its plate mills at Pottstown and Seyfert and rolled into sheared steel plates.

William A. Rogers on Our Relations with China and Japan

William A. Rogers, of Rogers, Brown & Co., Buffalo, has returned from a four months' visit to China and Japan, during which he had an opportunity to discuss the future relations of America and the Orient with the leading men in both countries. In an interview given to the Buffalo *Express* he gives his impressions of the friendly attitude of both peoples toward the United States, saying among other things:

"China is the big problem of the world. The future peace of the world turns on the attitude and action of the United States and Japan regarding this problem during the next few years. A friendly co-operation of the two countries coupled with a firm insistance on our part on an actual open door, which, although existing in theory is in fact a door scarcely ajar, will save untold troubles for ourselves and other nations in the future.

"China, because of her marvelous mineral and agricultural resources, is an object of interest to all the great powers. Japan recognizes that if any other nation secures a commanding influence in China her own national existence is imperiled. She has fought two wars to prevent that. She would like to be the dominating power herself, but recognizing that other nations will not permit her to be, she is anxious to join hands with the United States, whom she considers altruistic in her motives. China is extremely friendly to Americans.

"During the private audience which President Li Yuen Hung extended to us he spoke of the United States as a nation of high ideals and animated by no selfish ends in dealing with his country. He said it was his intention that China should follow the lead of the great republic in all matters concerning the European war. He seems to be having a hard time in bringing about a declaration of war, but this is due to the fact that his cabinet is largely composed of mandarins of the old regime, who, having had military training in Germany, are naturally pro-German besides holding the opinion that Germany may yet win the war.

"A few days before sailing from Japan, the premier, Count Terauchi, gave me a dinner at his official residence at which there were present thirteen Japanese and seven Americans. The spirit of the occasion was friendliness for the United States. The Japanese have adopted English as the official language and the chief foreign language for business purposes."

New Blast Furnace for Brier Hill

The Brier Hill Steel Company, Youngstown, Ohio, has placed a contract with the Riter-Conley Company, an interest of the McClintic-Marshall Company of Pittsburgh, for the erection of a 500-ton blast furnace at Youngstown, work on which will start at once, and the furnace will be erected in the shortest possible time. This stack is being built in order to round out the needs of the Brier Hill Steel Company for metal, the company having added in 1916 four 100-ton open-hearth steel furnaces, increasing its output of open-hearth steel more than 800 tons per day. The company has also placed contracts for the erection of a large power house to contain the electric power equipment for driving two new plate mills, contract for which the company placed with the United Engineering & Foundry Company, Pittsburgh, about a month ago. This 500-ton blast furnace, power house, and the two new plate mills embrace all the new additions under way by the Brier Hill Steel Company at the present time.

The John Eichleay, Jr., Company, Pittsburgh, in view of the amount of business handled by its structural steel, house-moving and scrap-iron departments, has opened an office at 418 Oliver Building, in addition to the main office at South Twentieth and Wharton Streets.

The Joseph Joseph & Brothers Company, dealer in old material, has removed its Chicago offices from the Railway Exchange Building to suite 1830-39 McCormick Building.

Pittsburgh and Nearby Districts

The Citizens Title & Trust Company of Uniontown, Pa., has presented a bill in equity, asking that a mortgage it holds on the plant of the Keystone Tube Works at Uniontown be foreclosed. The plant has not been in operation for some years, and in 1911 the company issued bonds to the amount of $50,000, of which $45,000 with interest is now due.

The Asbestos Protected Metal Company, Pittsburgh, announces the temporary closing of its Atlanta and St. Louis offices. This is due to the fact that J. R. Nichols, Atlanta manager, has entered the Officers' Reserve Corps at Fort McPherson and F. C. Basterby, St. Louis manager, has entered the Officers' Reserve Corps at Fort Riley, Kansas. Communications addressed to the home office, First National Bank Building, Pittsburgh, will receive attention.

Arthur G. McKee & Co., consulting and contracting engineers, Cleveland, have taken a contract for a gas producer plant for the Carbon Steel Company, Pittsburgh, to include a building 21 x 187 ft., bins, conveying equipment, gas mains, etc. Gas producers of the Hughes type furnished by the Wellman-Seaver-Morgan Company, Cleveland, will be installed. Contract has also been taken for a producer plant for the Pittsburgh Window Glass Company, Washington, Pa., which includes two producers, coal bunkers and coal handling equipment.

The F. W. Perry Machine Company, Youngstown, Ohio, has been incorporated with a capital stock of $10,000 by F. W. Perry and others to do general machine shop work.

The Oliver interests at Pittsburgh have subscribed for $1,527,000 worth of Liberty bonds. Included in this amount is an individual subscription of the Oliver Iron & Steel Company for $500,000 worth.

The Washington Mold Machine & Foundry Company, Washington, Pa., has been incorporated with a nominal capital of $5,000 by W. M. Crile, W. J. Bromley, G. W. Hennings, all of Washington.

The Haws Refractories Company, Johnstown, Pa., is building a new silica brick plant at Narrows, Pa., near Johnstown, Pa., to have a capacity of 60,000 brick per day. The company is also building two new kilns at its Campbells Patch works and two at its Cooperdale plant, both near Johnstown, Pa., to have a total capacity of 20,000 fire brick per day.

Electrical workers in Pittsburgh and Allegheny county now being paid $5 per day will receive $5.50 per day from August 1 next to April 1, 1918, and from the latter date will receive $5.50 to $6 per day until the expiration of the present wage contract with employers on July 1, 1919. Under their present agreement the electrical workers were not entitled to any advance in wages before July 1, 1919, but the men had a conference with their employers and urged that they were entitled to an advance owing to the much higher cost of living, and the employers agreed to advance the men as noted above.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has let a contract for the first unit of 50 houses to be built near its works at East Youngstown. The company intends to build 1000 or more houses of different design for employees.

Owing to the recent accident at its power plant the Republic Iron & Steel Company has not yet started its new 550-ton blast furnace, but expects to get this stack in blast the latter part of this month. This will give the Republic Company a total of eight blast furnaces, five at Haselton, Hannah at Youngstown, Ohio, Atlantic at New Castle and Hall at Sharon, Pa. With all these stacks going the Republic Company expects to be in position to supply its entire needs of pig iron.

The 72-in. 3 high plate mill, in the plant of the Youngstown Iron & Steel Company at Haselton, Ohio, now owned by the Sharon Steel Hoop Company, Sharon, Pa., was put in operation June 4. During the last 60 days the mill has been remodeled and repaired, is now in splendid condition, and is expected to turn out 5000 tons or more of plates per month, up to 70-in. wide.

E. M. Herr, president Westinghouse Electric & Mfg. Company, East Pittsburgh, says that there is nothing in the report that the plant at Essington, Pa., is to be doubled, nor in the statement in that connection that a lot of machine tools duplicating the Essington equipment is to be purchased.

British Coal Gas for Heat Treating Steel

The value of coal gas in the heat treatment of metals for industrial purposes is now being demonstrated in England at the plant of a large gas company. A room has been fitted up by the Davis Furnace Company with a dozen of its types of furnaces for annealing, tempering, hardening or melting of metals, and they are all actually operating. The company states that these furnaces are employed to-day in large numbers, fired with coal gas costing something like 2s. (48c.) per 1000 cu. ft. One furnace took a load of 4 tons of cold steel and consumed 2750 cu. ft. of gas per hour, and gas is found economical for both small and large furnaces. Hadfield's of Sheffield consumed entirely for war work not less than 500,00,000 cu. ft. of gas per annum, produced from 40,000 to 50,000 tons of coal. No space is required for the storage of ashes, and the furnace can be brought close to the machine worker. Capital expenditure is in many cases lower than that for coal furnaces. No special structural alterations are required in the plant.

Takes Over Power Company

The Hydro-Electric Power Commission of Ontario, by assuming a financial obligation of $22,669,000, has acquired control of the Ontario Power Company, together with all charter rights, contracts and physical assets valued at $26,900,694. The possession of the properties passes into the hands of the Provincial Commission August 1. In return for all the Canadian properties of the company, along with all physical assets and contracts for the delivery of power, the commission has agreed to pay, in its own debentures, to the extent of $8,000,000 for the $10,000,000 of capital stock now held by the company, and to assume a bonded liability of $14,699,000 outstanding and secured by first mortgage on the property. The bonds are guaranteed by the province, bear interest at 4 per cent and mature in 40 years.

The Central Iron & Steel Company, Harrisburg, Pa., following the termination of its receivership, noted in last week's issue, has prepared a statement under date of June 1 pointing out that in the five years of the receivership the mills have been, to a great degree, rebuilt, about 40 per cent new open-hearth capacity has been added and the blast furnace has been made over practically new. The business was established in 1853 and the product in the early days consisted of charcoal iron plates, with an annual output of only 1000 tons. Within a few years the product was increased to 2500 tons per year and the number of employees was 50, while to-day the capacity is 150,000 tons of plates per year and the employees number almost 1500.

The nineteenth annual summer session of the College of Engineering, University of Wisconsin, will be held at Madison, Wis., in the six weeks period beginning June 25. Courses will be given in chemistry, electrical, steam and hydraulic engineering, gas engines, machine design, mechanical drawing, mechanics, shop work and surveying. For information, application should be made to Prof. F. E. Turneaure, Madison, Wis.

Net earnings of the Pittsburgh Coal Company, Pittsburgh, for the first three months of this year are said to have increased about $1,500,000 over the same period in 1916.

Machinery Markets and News of the Works

UNCERTAINTY CAUSES LAG

Ship Program Now Major Interest

Machine Tool Orders Slacken—Inquiries Brisk—Big Business Expected from Ship, Engine and Motor Truck Builders

A marked slackening in orders for machine tools has been noted during the past week in several of the industrial centers, but inquiries continue to be received in large numbers, and it is freely predicted that a huge volume of business will be placed as soon as some of the uncertainty regarding Government contracts, delivery of raw materials and the labor supply is removed.

Shipbuilding activities are reported on both coasts, the Gulf, the Great Lakes and Canada, over 30 new projects and plant expansions being found in the week's news. One Seattle yard has received an order from the Shipping Board for six steel ships at a cost of about $8,000,000. The eastern yards are spending huge sums on extensions and improvements, preparing to turn out steel ships at high speed when pending contracts are closed.

The motor truck and airplane industries are expected to come into the market on an increasingly large scale before long. This is particularly true of the motor truck plants which expect to be participants in the program outlined by the Government. The Republic Motor Truck Company contemplates the expenditure of $750,000 for expansion, and a $1,000,000 motor truck company has been formed in Philadelphia. The inability to forecast future conditions is keeping the automobile makers out of the market, but it is not believed that this condition will long continue.

Crane manufacturers are besieged for early delivery, but are booked for months ahead and are working closely with the Government to meet its urgent needs. Delivery of boring mills is being pushed steadily backward and one maker is now quoting only for 1919 delivery. There is a greatly increased demand for portable electric and pneumatic tools and several manufacturers are engaged in extensive plant expansion to fill direct and indirect Government orders.

The railroads are becoming more active and there is no let-up in foundry growth all over the country. Agricultural and mining developments are bringing a heavy demand upon engine and pump makers.

New York

NEW YORK, N. Y., June 6, 1917.

May was a good month in the machinery trade, and the past week has seen a continuation of the influx of orders and inquiries. While large inquiries are numerous, the slowness of the Government in actually placing contracts is holding these prospective orders in abeyance and the bulk of the business being placed is for one or two machines of a kind. A large part of the current demand is for plant expansion; the remainder is for munitions work to replace the units sold when orders for the Allies were completed. Many machine shops are preparing for the expected flood of business by ordering a machine here and there to balance up production in various departments, and this on the whole accounts for a considerable portion of purchases now being made.

Inquiries for large sizes of machine tools continue to be the main feature, and for the first time in many months prompt delivery can be made on screw machines and the smaller lathes. There seems to be no end to the demand for universal milling machines, planers and boring mills. One large maker of boring mills is now quoting for 1919 delivery, and it is reported that other leading makers are in a similar position and are making no gain against the inflow of orders. The local market is beginning to feel the effect of the recent placing of large shell orders and expects to be called upon for a considerable volume of new equipment as soon as the concerns which have received the awards can analyze their requirements.

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Pittsburgh and Nearby Districts

The Citizens Title & Trust Company of Uniontown, Pa., has presented a bill in equity, asking that a mortgage it holds on the plant of the Keystone Tube Works at Uniontown be foreclosed. The plant has not been in operation for some years, and in 1911 the company issued bonds to the amount of $50,000, of which $45,000 with interest is now due.

The Asbestos Protected Metal Company, Pittsburgh, announces the temporary closing of its Atlanta and St. Louis offices. This is due to the fact that J. R. Nichols, Atlanta manager, has entered the Officers' Reserve Corps at Fort McPherson and F. C. Basterby, St. Louis manager, has entered the Officers' Reserve Corps at Fort Riley, Kansas. Communications addressed to the home office, First National Bank Building, Pittsburgh, will receive attention.

Arthur G. McKee & Co., consulting and contracting engineers, Cleveland, have taken a contract for a gas producer plant for the Carbon Steel Company, Pittsburgh, to include a building 21 x 187 ft., bins, conveying equipment, gas mains, etc. Gas producers of the Hughes type furnished by the Wellman-Seaver-Morgan Company, Cleveland, will be installed. Contract has also been taken for a producer plant for the Pittsburgh Window Glass Company, Washington, Pa., which includes two producers, coal bunkers and coal handling equipment.

The F. W. Perry Machine Company, Youngstown, Ohio, has been incorporated with a capital stock of $10,000 by F. W. Perry and others to do general machine shop work.

The Oliver interests at Pittsburgh have subscribed for $1,527,000 worth of Liberty bonds. Included in this amount is an individual subscription of the Oliver Iron & Steel Company for $500,000 worth.

The Washington Mold Machine & Foundry Company, Washington, Pa., has been incorporated with a nominal capital of $5,000 by W. M. Crile, W. J. Bromley, G. W. Hennings, all of Washington.

The Haws Refractories Company, Johnstown, Pa., is building a new silica brick plant at Narrows, Pa., near Johnstown, Pa., to have a capacity of 60,000 brick per day. The company is also building two new kilns at its Campbells Patch works and two at its Cooperdale plant, both near Johnstown, Pa., to have a total capacity of 20,000 fire brick per day.

Electrical workers in Pittsburgh and Allegheny county now being paid $5 per day will receive $5.50 per day from August 1 next to April 1, 1918, and from the latter date will receive $5.50 to $6 per day until the expiration of the present wage contract with employers on July 1, 1919. Under their present agreement the electrical workers were not entitled to any advance in wages before July 1, 1919, but the men had a conference with their employers and urged that they were entitled to an advance owing to the much higher cost of living, and the employers agreed to advance the men as noted above.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has let a contract for the first unit of 50 houses to be built near its works at East Youngstown. The company intends to build 1000 or more houses of different design for employees.

Owing to the recent accident at its power plant the Republic Iron & Steel Company has not yet started its new 550-ton blast furnace, but expects to get this stack in blast the latter part of this month. This will give the Republic Company a total of eight blast furnaces, five at Haselton, Hannah at Youngstown, Ohio, Atlantic at New Castle and Hall at Sharon, Pa. With all these stacks going the Republic Company expects to be in position to supply its entire needs of pig iron.

The 72-in. 3 high plate mill, in the plant of the Youngstown Iron & Steel Company at Haselton, Ohio, now owned by the Sharon Steel Hoop Company, Sharon, Pa., was put in operation June 4. During the last 60 days the mill has been remodeled and repaired, is now in splendid condition, and is expected to turn out 5000 tons or more of plates per month, up to 70-in. wide.

E. M. Herr, president Westinghouse Electric & Mfg. Company, East Pittsburgh, says that there is nothing in the report that the plant at Essington, Pa., is to be doubled, nor in the statement in that connection that a lot of machine tools duplicating the Essington equipment is to be purchased.

British Coal Gas for Heat Treating Steel

The value of coal gas in the heat treatment of metals for industrial purposes is now being demonstrated in England at the plant of a large gas company. A room has been fitted up by the Davis Furnace Company with a dozen of its types of furnaces for annealing, tempering, hardening or melting of metals, and they are all actually operating. The company states that these furnaces are employed to-day in large numbers, fired with coal gas costing something like 2s. (48c.) per 1000 cu. ft. One furnace took a load of 4 tons of cold steel and consumed 2750 cu. ft. of gas per hour, and gas is found economical for both small and large furnaces. Hadfield's of Sheffield consumed entirely for war work not less than 500,00,000 cu. ft. of gas per annum, produced from 40,000 to 50,000 tons of coal. No space is required for the storage of ashes, and the furnace can be brought close to the machine worker. Capital expenditure is in many cases lower than that for coal furnaces. No special structural alterations are required in the plant.

Takes Over Power Company

The Hydro-Electric Power Commission of Ontario, by assuming a financial obligation of $22,669,000, has acquired control of the Ontario Power Company, together with all charter rights, contracts and physical assets valued at $26,900,694. The possession of the properties passes into the hands of the Provincial Commission August 1. In return for all the Canadian properties of the company, along with all physical assets and contracts for the delivery of power, the commission has agreed to pay, in its own debentures, to the extent of $8,000,000 for the $10,000,000 of capital stock now held by the company, and to assume a bonded liability of $14,699,000 outstanding and secured by first mortgage on the property. The bonds are guaranteed by the province, bear interest at 4 per cent and mature in 40 years.

The Central Iron & Steel Company, Harrisburg, Pa., following the termination of its receivership, noted in last week's issue, has prepared a statement under date of June 1 pointing out that in the five years of the receivership the mills have been, to a great degree, rebuilt, about 40 per cent new open-hearth capacity has been added and the blast furnace has been made over practically new. The business was established in 1853 and the product in the early days consisted of charcoal iron plates, with an annual output of only 1000 tons. Within a few years the product was increased to 2500 tons per year and the number of employees was 50, while to-day the capacity is 150,000 tons of plates per year and the employees number almost 1500.

The nineteenth annual summer session of the College of Engineering, University of Wisconsin, will be held at Madison, Wis., in the six weeks period beginning June 25. Courses will be given in chemistry, electrical, steam and hydraulic engineering, gas engines, machine design, mechanical drawing, mechanics, shop work and surveying. For information, application should be made to Prof. F. E. Turneaure, Madison, Wis.

Net earnings of the Pittsburgh Coal Company, Pittsburgh, for the first three months of this year are said to have increased about $1,500,000 over the same period in 1916.

Machinery Markets and News of the Works

UNCERTAINTY CAUSES LAG

Ship Program Now Major Interest

Machine Tool Orders Slacken—Inquiries Brisk—Big Business Expected from Ship, Engine and Motor Truck Builders

A marked slackening in orders for machine tools has been noted during the past week in several of the industrial centers, but inquiries continue to be received in large numbers, and it is freely predicted that a huge volume of business will be placed as soon as some of the uncertainty regarding Government contracts, delivery of raw materials and the labor supply is removed.

Shipbuilding activities are reported on both coasts, the Gulf, the Great Lakes and Canada, over 30 new projects and plant expansions being found in the week's news. One Seattle yard has received an order from the Shipping Board for six steel ships at a cost of about $8,000,000. The eastern yards are spending huge sums on extensions and improvements, preparing to turn out steel ships at high speed when pending contracts are closed.

The motor truck and airplane industries are expected to come into the market on an increasingly large scale before long. This is particularly true of the motor truck plants which expect to be participants in the program outlined by the Government. The Republic Motor Truck Company contemplates the expenditure of $750,000 for expansion, and a $1,000,000 motor truck company has been formed in Philadelphia. The inability to forecast future conditions is keeping the automobile makers out of the market, but it is not believed that this condition will long continue.

Crane manufacturers are besieged for early delivery, but are booked for months ahead and are working closely with the Government to meet its urgent needs. Delivery of boring mills is being pushed steadily backward and one maker is now quoting only for 1919 delivery. There is a greatly increased demand for portable electric and pneumatic tools and several manufacturers are engaged in extensive plant expansion to fill direct and indirect Government orders.

The railroads are becoming more active and there is no let-up in foundry growth all over the country. Agricultural and mining developments are bringing a heavy demand upon engine and pump makers.

New York

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Street. John G. Lowe, 201 Pearsall Avenue, and Christopher Spence head the company.

The Standard Motor Construction Company, 180 Whiton Street, Jersey City, N. J., manufacturer of marine engines, will erect a one-story extension to cost $4,500.

M. J. Kearney, Hoboken, N. J., operating a coppersmith works at 1206 Clinton Street, consisting of shop and foundry, is planning for the removal of his plant on Twenty-eighth Street, New York, to the local site, with increased facilities to accommodate the business. Mr. Kearney is said to be associated with P. H. Kearney & Sons, coppersmiths, 504 West Twenty-seventh Street, New York.

The East Jersey Pipe Company, 156 Ellison Street, Paterson, N. J., manufacturer of steel pipe, has received an order from the Government for 3-in. shells, and is reported planning for improvements and increased facilities. A. W. Kolbert is superintendent.

The Manufacturers' Iron & Steel Company, New Brunswick, N. J., has been incorporated with a capital of $8,000,000 to manufacture iron and steel products. The company will take over and handle the output of the Neverslip Mfg. Company, Hamilton Street, New Brunswick, manufacturer of horseshoes and calks, and the Bryden Horse Shoe Company, Front Street, Catasauqua, Pa. The incorporators are James A. Johnson, of Johnson & Johnson, George Street, New Brunswick, manufacturer of surgical dressings, etc.; Robert C. Nicholas and William J. McCurdy, New Brunswick.

The Mehl Tool & Die Works, Roselle, N. J., has recently completed the erection of a new factory in the Lorraine district.

A. G. Belnap, Inc., Perth Amboy, N. J., has been incorporated with a capital of $100,000 to operate a general automobile plant and business, with repair works, at 151-9 New Brunswick Avenue. Frank VanSyckle, Perth Amboy, and Andrew G. Belnap, 182 Central Avenue, East Orange, are the incorporators.

The Lambert & Todd Machine Company, 119 Arch Street, Camden, N. J., manufacturer of general machinery, has acquired property adjoining its plant, formerly occupied by the Phoenix Meter Company, and will build a two-story addition. It is planned to double the capacity of the works, which are now being used for the manufacture of armored motor cars.

The Astoria Veneer Mills & Dock Company, Blackwell Street, Long Island City, New York, has recently acquired a one-story factory on Davis Street to be used for expansion.

The plant of the Brooklyn Cooperage Company, 142 Kent Avenue, Brooklyn, N. Y., was recently destroyed by fire with loss estimated at $175,000.

The Perkins Foundry Company, Inc., Amsterdam, N. Y., has increased its capital from $20,000 to $50,000.

The Hewitt Rubber Company, Buffalo, Kensington Avenue and the New York Central Belt Line, has increased its capital stock from $500,000 to $1,000,000, and is having plans prepared for the erection of a tire plant on a site adjoining the present plant with a capacity of 5000 automobile tires per day. H. H. Hewitt is president and J. H. Kelly and F. V. Springer, formerly connected with the Republic Rubber Company, Youngstown, Ohio, have become associated with Mr. Hewitt in the management of the company.

The Stewart Motor Corporation, 9 Randall Street, Buffalo, will build an addition, 40 x 124 ft., to its plant at East Delavan Avenue and the New York Central Railroad Belt Line.

The American Radiator Company, Buffalo, is building a steel and brick foundry building at its Pierce plant, Elmwood Avenue and the New York Central Railroad Belt Line.

The Pennsylvania Railroad Company, Buffalo, is building an addition to its power-house at Babcock Street.

The H. G. Trout Company, Buffalo, is adding a one-story steel and brick foundry building and a power house to its iron works at Ohio and Moore streets.

The National Sugar Refining Company, Yonkers, N. Y., will build a boiler-house to cost $140,000 at its plant at the foot of Main Street. N. T. Andrews is manager.

The Stevens Industrial Corporation, Yonkers, N. Y., has been incorporated with a capital stock of $1,500,000, and will erect a manufacturing building.

The Willys, Morrow Company, Elmira, N. Y., John N. Willys, president, is having plans prepared for an addition to its manufacturing plant.

The Fairbanks Company, Binghamton, N. Y., has had plans drawn for an addition to its foundry on Glenwood Avenue.

New England

BOSTON, MASS., June 4, 1917.

The absence of large inquiries and the continued good sales of machines in small lots have featured the machine tool business of New England this week. One Boston plant, which was particularly successful in the manufacture of 3-in. shells for the Allies, has been in the market for added equipment and it is reported has a substantial contract from the Government for small shells. It would be difficult to find a machine tool builder in this section who is not working at top capacity and adding help when it can be secured.

Deliveries on small sized tools are becoming a little easier, on many types of tools, but this does not include universal milling machines, universal grinding machines, sensitive and radial drills. On such lines as these and on planers, the manufacturers are swamped with business and sold up well toward the end of 1918. Theer is a strong demand for large lathes and planers and deliveries on these are well into the future. The uncertainty of Government demands is still a factor in the general situation and many inquiries are being held in abeyance.

Prices are advancing more slowly probably in New England than in any other part of the country as the conservative and far-sighted New England machine tool men are issuing advances with great reluctance and are taking every possible step to protect their regular customers and to safeguard the future of their businesses under the normal conditions that will come when peace is declared. They are acting almost as a unit in turning down the enticing offers at almost fabulous prices for quick delivery.

The Torrington Company, Torrington, Conn., which has been operating under a Maine charter with capital stock of $4,500,000, has taken out a Connecticut charter under the same name with authorized capital stock of $11,000,000. It is understood that one of the first steps will be to eliminate the various operating subsidiary companies and concentrate the management and control in the new company. The new charter is drawn to permit manufacturing of any kind of tools, implements and appliances, to cover the activities of the operating companies which now manufacture needles, motorcycle and bicycle parts, vacuum cleaners and carpet sweepers, spark plugs, and many other kinds of hardware, tools and machines. The incorporators named in the application are Allen E. Moore and George F. Jebbett of New York City, and S. C. T. Todd of Brooklyn, N. Y.

The Shelton Tack Company, Shelton, Conn., a reorganization of the Shelton Company, has been incorporated with a capital stock of $130,000. Harold E. Drew of Ansonia and Frank M. Clark and George E. Barber of Derby are the incorporators.

The Wallace Barnes Company, Bristol, Conn., has awarded a contract for an addition to its factory to cost $4,000.

The Eagle Pocket Knife Company, New Haven, Conn., recently incorporated with a capital stock of $12,000, has been organized with O. L. Hemming, formerly president of the Hemming Brothers Corporation, president; Emanuel J. Boyler, vice-president, and Sigmund F. Beck, secretary. The company has leased part of the factory at 24 William Street.

The Watts Laundry Machine Company, Willimantic, Conn., has awarded a contract for a factory, 60 x 120 ft., one story.

The Bassick Company, Bridgeport, Conn., has been incorporated with a capital stock of $6,000,000, of which $3,700,000 is paid in. E. W. Bassick, W. F. Burns, W. R. Bassick and F. C. Bassick of Bridgeport, and W. A. Schenck of Meriden are the incorporators.

The Van Norman Machine Tool Company, Springfield, Mass., has awarded a contract for a factory to cost $8,000.

The Connecticut Steel Corporation, Bridgeport, Conn., has been incorporated with a capital stock of $2,000 to manufacture metal goods. The incorporators are William S. Lare and Arnold W. Knauth of New York City and Cornelius C. Webster, Brooklyn.

The Sandy Point Shipbuilding Company, Belfast, Me., has been incorporated with a capital stock of $250,000 by Union S. Adams, Townsend, Mass.; Isaac C. Atkinson, Milton, Mass.; Howard B. Capen, Stockton Springs; Elon B. Gilchrist, Belfast, and Paul E. Atkinson, Milton.

The Cumberland Shipbuilding Company, Portland, Me., has been incorporated with a capital stock of $500,000 by E. H. Irvin, E. V. Mann, M. F. Day, F. B. Rowe and M. D. Griffin, Portland.

The Stamford Electric & Mfg. Company, Stamford, Conn., has been incorporated with a capital stock of $150,000 by Edward Heitman, William M. Foord and Matthew H. Kenealy.

The North & Judd Mfg. Company, New Britain, Conn., will vote at a stockholders' meeting, June 6, on a recom-

mendation of the directors to increase the capital stock of the company $250,000, which will bring the issue of capital stock to the full authorized amount of $1,500,000.

Hollander & Johnson, Inc., Worcester, Mass., is a new corporation with authorized capital stock of $20,000, to manufacture drop forgings, dies, tools and molds. The directors are Sven G. Hollander, president and treasurer, C. O. Johnson and J. O. Sibley.

The Arcade Malleable Iron Company, Worcester, Mass., is to erect an office building, 42 x 52 ft., one story.

The Parker & Harper Mfg. Company, Worcester, Mass., has been incorporated with authorized stock of $25,000. The directors are Waldo D. Parker, president; Joseph Parker, 67 June Street, treasurer, and E. T. Harper.

The Whitin Machine Company, Whitinsville, Mass., has awarded a contract for an office building, 60 x 125 ft., three stories.

The Graham Mfg. Company, Providence, R. I., has been incorporated with authorized capital stock of $30,000 to deal in machinery and tools. The incorporators are Arthur W. Graham and Alfred G. Chaffee, Providence, and Andrew E. Johnson, Pawtucket.

The Master Combination Lock Company, Worcester, Mass., has been incorporated with authorized capital stock of $25,000. The directors are H. H. Mathews, president; James F. McHugh, treasurer; and R. A. Jordan.

Philadelphia

PHILADELPHIA, PA., June 4, 1917.

The Gill Glass Company, Philadelphia, has awarded a contract for the erection of its proposed new plant at Amber and Venango streets to William R. Dougherty, 1610 Sansom Street, at a cost of $200,000. It will be three stories, brick and concrete, about 145 x 180 ft.

The Pennsylvania Railroad Company, Philadelphia, has had plans prepared for a one and two-story shop building, about 90 x 300 ft., to be erected at its Juniata works, near Altoona. It will be used for tank and heavy plate manufacture. M. J. Davis, assistant engineer of motive power, Altoona, is in charge.

The Stokes & Smith Company, Summerdale Avenue, Philadelphia, manufacturer of machinery, will erect an addition to its machine shop to cost about $4,000.

A one-story power house, about 35 x 133 ft., will be erected by the Hulton Dyeing & Finishing Company at Coral and Walnut streets, Philadelphia.

The Conestoga Motor Truck Company, Philadelphia, has been incorporated in Delaware with a capital of $1,000,000 to manufacture motor trucks and automobiles. W. C. Arnold, Frank J. Riera, Jr., and H. Wolfenden, Philadelphia, are the incorporators.

The Quaker City Rubber Company, Market Street, Philadelphia, will erect a one-story machine shop, about 50 x 100 ft., at Cornby and Milnor streets.

The Pennsylvania Forge Company, Philadelphia, has awarded a contract for the erection of a one-story machine shop, 60 x 105 ft., at Delaware Avenue and Buckius Street, to cost about $6,000.

The Philadelphia Electric Company, Philadelphia, has filed plans for the erection of its one-story brick and concrete power plant, 50 x 100 ft., on Robbins Street, to cost about $120,000.

The Plexus Tire & Rubber Company, State Road and Levick Street, Philadelphia, will build a one and two-story addition to its works, about 60 x 125 ft.

The Powers-Weightman-Rosengarten Company, Ridge Avenue and Calumet Street, Philadelphia, manufacturer of chemicals, is planning for the immediate rebuilding of the portion of its plant recently destroyed by fire, to consist of a one and two-story building to cost about $25,000.

The United States Navy Department, Bureau of Docks and Yards, is taking bids for the erection of a new shop building, brick and concrete, 97 x 265 ft., at the League Island Navy Yard, Philadelphia.

The G. & H. Barnett Company, 1078 Frankford Avenue, Philadelphia, manufacturer of files, is taking bids for the erection of a boiler plant addition, 30 x 70 ft. at Frankford and Richmond avenues.

The Traylor Engineering & Mfg. Company, Allentown, Pa., manufacturer of rock crushing machinery, etc., has commenced remodeling and improvement work on the former plant of the Enterprise Mfg. Company, Cornwells, near Bristol, Pa., recently acquired for a shipbuilding works. Machinery and equipment is being installed. It is planned to devote the new plant to the production of steel and wood ship hulls, manufacturing engines, boilers and other operating equipment at the Allentown works. It is said that the new plant will give employment to about 600 for initial operations.

Neman & Saul, Hamburg, Pa., operating a foundry for the production of iron and steel castings, are planning to double the capacity by the installation of new equipment.

Shepherd & Rust, 42 West Market Street, Wilkes-Barre, Pa., operating an electrical construction plant, has incorporated the Shepherd-Rust Company with capital of $75,000 to manufacture lighting fixtures and similar specialties. Harold N. Rust is president.

The Penn Mfg. Company, Wilkes-Barre, Pa., manufacturer of mining supplies and equipment, will build a two-story addition to its plant to cost about $12,000. Henry F. Maier, Coal Exchange Building, Wilkes-Barre, is the architect.

The Pyro Ignition Company, a New York corporation, has acquired a three-story factory at Carpenter and Cherry streets, Reading, Pa., and will establish a plant for the manufacture of spark plugs and ignition specialties.

The Phillippi Sanitary Cooler Company, Pottstown, Pa., manufacturer of water coolers, has been acquired by E. S. Fretz, Pottstown, and associates. The company will be known as the Sanitary Cooler Company. Plans are being made to increase the present output. W. H. Musser, Harrisburg, and B. Coleman, Coatesville, are interested in the enterprise.

The Washington Mold Machine & Foundry Company, Washington, Pa., has been incorporated with a capital of $25,000 to operate a local plant. Charles Bromley is the principal incorporator.

The former plant of the Marietta Agricultural Works, Front and Pine streets, Marietta, Pa., has been acquired by the Pittsburgh Brass & Iron Foundry Company. The new owners plan to remodel and improve the works for a branch plant. It is reported that the new equipment will be installed.

The Hershey Machine & Foundry Company, Manheim, Pa., manufacturer of iron and steel castings, has commenced the erection of two one-story additions to its plant, about 50 x 300 ft., and 40 x 90 ft.

The Pusey & Jones Company, Wilmington, Del., will make extensions and improvements at its shipbuilding plant before the close of the year to cost about $250,000. The company is affiliated with the Pennsylvania Shipbuilding Company, Land Title Building, Philadelphia.

The Harlin & Hollingsworth Corporation, Wilmington, Del., has awarded a contract for three additions to its plant, consisting of a two-story pipe shop, about 80 x 110 ft., one-story general shop, 20 x 80 ft., and one-story garage, 30 x 50 ft., estimated to cost $100,000.

Baltimore

BALTIMORE, MD., June 4, 1917.

The Baltimore Tube Company, Wicomico and Ostend streets, Baltimore, will erect a plant, 140 x 600 ft., for the manufacture of sheet brass and copper, to cost about $500,000. C. S. Morse is president.

The Motors Cooling System Company, 48 South Charles Street, Baltimore, Md., manufacturer of cooling devices for automobiles, is planning to double the capacity of its plant by the installation of new machinery. Frederick H. Gottlieb is president.

Joseph Sanders, Washington, D. C., has incorporated in Delaware the Gyro Company, with a capital of $50,000 to operate general machine shops. George C. Rogers and Harry I. Chew are other incorporators.

Chicago

CHICAGO, ILL., June 4, 1917.

While May was an extremely good month with some machine-tool dealers in this territory, the past few days have shown a lessening of both inquiries and sales. This applies more to smaller machines wanted for miscellaneous purposes. The larger sizes can be readily disposed of. One explanation of the lighter demand is that manufacturers are inclined to pause before adding to their equipment until they know better where they stand in regard to future deliveries of raw materials.

The Santa Fé has added to the list of tools it has under inquiry, and the Illinois Central has about finished taking bids on the large list it wants for distribution among its several shops. Tractor manufacturers have placed some orders the past week, the largest calling for machines valued at $15,000. In some cases business has been lost because

of long deliveries. Engine and turret lathes are obtainable with comparative ease, but in general little change in the matter of deliveries is noted.

It is reported that some delay may be experienced in the construction of the new Armour plant at South St. Paul for the equipment of which estimates for machine tools were asked a short time ago. Bids for the new plant were submitted April 25, but many contractors conditioned their bids on changes in the prices of materials. Not only is building material high in price, but labor is scarce.

Building work in Chicago is fairly active, but operations in May were lower in point of volume and frontage than in any similar period in ten years, while in money it was the fourth lowest month in ten years. Unsettled weather conditions, as well as the high cost of materials, is held responsible for the slump. The estimated cost of buildings for which permits were issued in May was $6,552,800, against $13,707,100 for the same month a year ago. Permits were issued for 619 buildings in May, against 1207 in the same month a year ago. The reconstruction of buildings and additions embraces a large part of the activity.

There is a feeling that the Government should place more munitions work in this district. Many small plants are equipped for parts manufacturing, though they cannot turn out a complete shell.

The Root & Van Dervoort Engineering Company, Moline, Ill., will expend at least $150,000 on its plant in which naval guns and gun-mounts will be made. Improvements and extensions to cost millions are to be made at the Rock Island Arsenal. Surveys have been made by representatives of Stone & Webster, Boston and New York. Westinghouse Church Kerr & Co. have cleared ground at the Arsenal for a field artillery munitions plant. Material is at hand and foundations are nearly completed.

George C. Nimmons & Co., architects, 122 South Michigan Avenue, have taken bids on a two-story addition, 100 x 160 ft., to a factory at Michigan Avenue and Thirty-ninth Street for the Old Reliable Motor Truck Company.

The Ehman Tire & Rubber Company will erect a one-story factory, 40 x 112 ft., in Twenty-seventh Street, west of La Salle Street, Chicago, to cost about $9,000. Dibelka, Flaks & Minchin, 130 North Fifth Avenue, are the architects.

The Burrell Belting Company, Chicago, has leased a four-story building at 413-417 South Hermitage Avenue for a term of years.

The Herbert Boiler Company, Chicago, has been incorporated at Springfield, Ill., with a capital stock of $100,000 by Michael E., William H., and Joseph J. Herbert of Chicago.

The R. B. Hayward Company, 406 West Erie Street, Chicago, manufacturer of ventilating apparatus, has leased a one-story factory, to be erected and completed July 1 at 849-853 West Ohio Street.

A large manufacturing company whose name has not been disclosed, because of uncertainty over building plans, has purchased 23½ acres at Western Avenue Boulevard and West Forty-seventh Street, Chicago, the sale being negotiated by Hodge & Chandler, Chicago, brokers in industrial real estate. The tract is served by the Chicago Junction, Pennsylvania and the Chicago River & Indiana railroads, giving it carload and less than carload service, by river and rail, at Chicago rates. The purchaser will occupy a portion of the property, and the remainder will be sold through the same brokers.

Plans have been prepared for reconstructing at a cost of $100,000, a five-story reinforced factory for the John C. Moninger Company, 900 Blackhawk Street, Chicago, maker of greenhouse building materials. William T. Hooper, 2719 South Michigan Avenue, is the architect.

The American Machine Tool Engineering Works, Chicago, has taken over the entire Neat lathe business of the National Engineering & Tool Works, Oak Park, Ill., and will continue to manufacture this lathe under its trade mark Amtew. Frank W. Hack, general works manager, organized the National Engineering & Tool Works and was formerly its president. Early in the year he organized the American Machine Tool Engineering Works. A number of improvements have been made in the design of the lathe which has just been acquired.

James E. Harvey and Richard E. Parton, Chicago, have incorporated in Delaware, the Mazophone Mfg. Company, with capital of $500,000 to manufacture talking machines. Other incorporators are E. Griffith-Williams, Virgil B. Mays, J. D. Keating and R. R. Hartman, Chicago.

The Lanham Mfg. Company, Chicago, has been incorporated in Delaware with a capital of $1,000,000 to manufacture farm machinery and implements. C. W. Lanham and E. A. Stickelman, Chicago, are the incorporators.

Milwaukee

MILWAUKEE, WIS., June 4, 1917.

While sellers of machine-tools report a hesitancy in the immediate demand, manufacturers have felt no slackening and no headway is being made catching up on deliveries. Shops are choked with business and the volume of orders on the books indicates that this condition will continue for several months. The last ten days have developed numerous shop extension projects in metal-working lines and the foundry industry continues to undergo a heavy expansion, accelerated by the urgency of new orders, many of which are directly associated with Government requirements. Cranes and hoists are in active demand and makers of gas engines, farm machinery, tractors, motor trucks and similar products report activity as the greatest ever known.

The Menominee Motor Truck Company, Menominee, Mich., has closed a contract with the Claude M. Nankival Company, New York, for $2,000,000 worth of motor trucks for exportation to Russia. Plans are being made to increase the facilities and to enlarge the working force from 100 to 150 men. E. C. Eastman, Marinette, Wis., is president.

The Dane Mfg. Company, Dane, Wis., manufacturer of agricultural tools and mechanical devices, has been reorganized under the name of Dane County Mfg. Company. The capital is $10,000 and the incorporators are A. J. Dohm, Ben A. Meek and R. O. Dohm.

The Manitowoc Shipbuilding Company, Minitowoc, Wis., is making extensive improvements to its plant, including an extension to the plate shop; a new machine-shop, 48 x 150 ft.; general storehouse, 48 x 225 ft., and a machinery storage building, 62 x 112 ft., all of steel construction, the contract for which has been awarded to the Wisconsin Bridge & Iron Company, North Milwaukee, Wis. The office building also is being enlarged. Additional property has been purchased to provide 1900 ft. of new dockage for one 600-ft. and one 360-ft. shipbuilding berth. The company employs more than 1000 operatives.

The LaVigne Gear Company, Racine, Wis., has broken ground for shop additions which will enable it to treble its production.

The A. E. White Machine Works, Eau Claire, Wis., maker of sawmill machinery, piston rings, etc., is having tentative plans prepared for a new plant, to consist of a machine-shop and foundry, 100 x 250 ft., three stories, to be erected on Wisconsin Street and operated when its lease on the present works expires early in 1919. A gray iron foundry, 40 x 100 ft., has just been completed and is being operated with day and night shifts.

The Stowell Company, South Milwaukee, Wis., foundry and machine shop, has engaged Leenhouts & Guthrie, architects, 424 Jefferson Street, Milwaukee, to prepare plans for a foundry addition, 75 x 160 ft. Equipment will be purchased as soon as specifications are completed. H. E. Marsh is general manager.

Otto Biefeld & Co., Watertown, Wis., who operate boiler, structural and machine shops, have incorporated under the style of the Otto Biefeld Company, with a capital stock of $75,000. The incorporators are Otto, Richard and Max E. Biefeld.

The Merrill Sheet Metal Works, Merrill, Wis., is enlarging its capacity for general sheet metal work, heating and ventilating systems, etc. The officers are: President, William T. Alpine; vice-president, L. J. Beloth; secretary-treasurer, George Pavlich.

The Winther Motor Truck Company, Kenosha, Wis., organized several months ago by M. P. Winther, formerly of the Thomas B. Jeffery Company to manufacture motor trucks, has located at Winthrop Harbor, Ill., just south of Kenosha, where an existing plant is being rebuilt. A new office building is also under construction.

Mayer Brothers, Antigo, Wis., founders and machinists, are increasing their output of power hammers, which now are being built in sizes up to 100 lb. Shipments are being made to the East and West as rapidly as the machines can be produced.

The Pawling & Harnischfeger Company, Milwaukee, is making extensive improvements and enlargements, necessitated by the great demand for its cranes and hoists. Contracts have been awarded for a 500-kw. generating unit, consisting of a Nordberg poppet valve engine, direct-connected to an Allis-Chalmers generator. Two 300-hp. Badenhausen boilers will be installed. The power plant is being enlarged by an addition, 50 x 80 ft., equipped with a monorail bucket hoist, mechanical stokers, and other appliances. Woodmansee & Davidson, Milwaukee and Chicago, are the consulting engineers. The company also is installing two new 10-ton yard cranes for handling materials. O. A. Ruemelin is vice-president and general superintendent.

The Wisconsin Aluminum Foundry Company, Manitowoc, Wis., is installing six new furnaces and is making other improvements, including the erection of a new storage house, 40 x 190 ft., to be better able to handle its orders. One of its largest contracts calls for 2,000,000 german silver bushings for the United States Army, and requiring a production of 10,000 castings a day.

The Standard Steel Corporation, Milwaukee, organized with $50,000 capital to manufacture concrete mixers, metal barn equipment, ventilators and other farm equipment, has placed a stock issue on the market and proposes to establish a plant during the present year. E. J. DeGuenther, Merrill Building, is general manager.

Indianapolis

INDIANAPOLIS, IND., June 4, 1917.

The Fort Wayne Engineering & Mfg. Company, Fort Wayne, Ind., has issued $100,000 of preferred stock.

The Schuh & Peavler Drain Tile Company, Francisco, Ind., has been incorporated with $30,000 capital stock. The directors are A. J. and L. B. Schuh and H. J. Peavler.

The Miami Screw Machine Products Company, Peru, Ind., has been incorporated with $25,000 capital stock to manufacture screw machine parts. The directors are V. A. Shortt, J. C. Rice and G. W. H. Welke.

The Marion Machine, Foundry & Supply Company, Marion, Ind., has increased its capital stock from $45,000 to $375,000.

The Edwards Instrument Company, Indianapolis, manufacturer of surgical and other instruments, has changed its name to the Edwards X-Ray Mfg. Company.

Detroit

DETROIT, MICH., June 4, 1917.

The demand for machine tools is very small. Large automobile companies and other leading factories continue to hold off and practically no good-sized orders or inquiries have been placed the past week. Jobbers are awaiting the beginning of munition manufacture, believing that large orders will be placed immediately on receipt of contracts from the Government. Airplane manufacture has been stimulated by the war, and machine-tool dealers expect that Detroit will become the aeroplane center of the country. Deliveries on milling machines have grown worse, but lathes and grinding machines are more easily obtainable.

The Government is rushing work on the new aviation field at Mount Clemens, Mich., and the hangars, machine shops and other buildings will be completed within a few months. About $1,000,000 will be spent on the work.

The Titan Motors Corporation, Detroit, has been organized with a capital stock of $350,000. The stockholders are Carl C. Kinkley, A. A. Gloetzner and Louis Mendelsohn.

The Ypsi Screw Company, Ypsilanti, Mich., has been organized with a $30,000 capitalization by W. M. Roberts, Stanley Kileski and C. F. Knight.

The capital stock of the Monorail Company of America, Detroit, has been increased from $50,000 to $100,000.

The All Season Body Company, Marshall, Mich., has taken over the factory of Page Brothers Company, and will manufacture detachable tops and bodies for automobiles. John McAvoy is general superintendent.

The Cadillac Auto Truck Company, Cadillac, Mich., has increased its capital stock from $200,000 to $350,000.

The Progress Auto Equipment Company, Detroit, has been organized with a capitalization of $50,000 to manufacture automobile parts. Those interested are Carl Torgl, O. H. Schnepper and Herman A. Schmidt.

It is reported that the Jackson Motor Car Corporation, Jackson, Mich., will establish a plant in Windsor, Ont.

The Republic Motor Truck Company, Alma, Mich., contemplates erecting a factory building this summer at an estimated cost of $750,000.

The Lansing Stamping & Tool Company, Lansing, Mich., will occupy its new factory by the middle of June. Increased business necessitated the new plant. The building, which will be enlarged later, is 66 x 300 ft., of steel frame and brick, and when completed will cost about $50,000, with the new machinery. The company specializes on its Capital internal grinder. In addition to the specialty it does a general steel stamping business. The officers are: President, J. H. Moores; vice-president and general manager, George Conway; secretary, F. M. Odel; treasurer, Charles H. Lawrence.

The Roeller Furnace Company, Bay City, Mich., has completed an addition to its plant, 50 x 120 ft., which enables it to double the number of men employed, and is now starting work on a second addition, 60 x 65 ft., three stories. A narrow gage railroad to reach all parts of the plant and yard is being built and the pattern shop enlarged. The company makes a general line of castings, from furnace to the fine aluminum and brass castings.

The McIntyre Motor Company, formerly of Toledo, has been organized in Kalamazoo, Mich., and now occupies a portion of the States Motor Car Company plant, formerly the Michigan Buggy Works. It will manufacture engines.

The Thermophore Company, Kalamazoo, Mich., manufacturing gas heaters, will occupy a new building within the next 30 to 60 days. The Thermophore Company has been having its material manufactured by contract.

President B. G. Appleby of the Erd Motor Company, Saginaw, Mich., announces that business is increasing so rapidly that it will be necessary before the end of the year to construct a large plant. An addition is being completed to the present factory, where 110 men are employed. The proposed new plant will require another site and the present buildings will be utilized for the manufacture of parts.

The Sampson Trailer Company, Grand Rapids, Mich., has been organized with a capital of $150,000, with $80,000 paid in, to manufacture automobile trailers. The company has taken an option on a site near Fuller station and it is expected that the erection of a suitable factory building will be started at once. E. T. Towar of the Towar-Ayers Company, Detroit, will be president.

Cleveland

CLEVELAND, OHIO, June 4, 1917.

Orders for machine tools have fallen off materially the past week. Inquiries continue good, but are mostly for small lots of machines or single tools, although one northern Ohio manufacturer has a list out of about 30 machines. The A. P. Williams Machinery Company, Toronto, Ont., is inquiring for about 50 machines, the purchase of which is contingent on the taking of a contract for work by a Canadian shop. Several inquiries are still held up awaiting the placing of Government orders. Manufacturers report a heavy demand for drill presses, but little call for lathes. Shipyards are active purchasers of punching and shearing machinery, and the demand for cranes is also heavy.

The Peerless Machine & Mfg. Company, Madison and West Seventy-fourth Street, Cleveland, will enlarge its plant by the erection of an addition to cost $10,000.

The Ohio Trailer Company, Cleveland, has purchased a site on Oakview Avenue near Dille Road where it plans to erect a factory to manufacture automobile trailers.

The Federal Foundry Supply Company, Cleveland, has acquired the building it occupies on East Seventy-ninth Street and an adjoining site upon which the erection of an addition is contemplated.

The Cleveland Co-operative Machinery Company recently incorporated with a capital stock of $10,000, has opened an office at 1141 Engineers Building and will deal in machinery, small tools and factory supplies. F. A. Maxwell is president, G. J. Hawkey, vice-president, and Louis A. Corlett, secretary.

The Bellefontaine Bridge & Structural Company, Bellefontaine, Ohio, has increased its capital stock from $100,000 to $150,000.

Cincinnati

CINCINNATI, OHIO, June 4, 1917.

The employment of women in several local plants is being considered. One non-ferrous foundry has already tried the experiment by using women in sorting light castings and the results so far have been satisfactory.

The inquiry for machine tools from domestic sources is exceedingly good, but buyers are slow in closing contracts. This condition is the same with wood-working machinery manufacturers, although orders for this class of equipment follow more closely inquiries sent out. The South is buying heavily of sawmill equipment, and a number of fair-sized mills have lately been contracted for by firms in West Virginia.

The labor situation locally is quiet, and the only nearby disturbance concerns a large foundry in Hamilton, Ohio, where the molders have been on a strike for about 10 days. Adjustments of differences are expected to be made before the week has passed.

The Cincinnati Building Commissioner's report, issued May 31, shows a decided gain for the first five months of the year over last year's record, and for the month of May the value of estimated improvements totals $2,363,370, as against

May, 1916, of $1,043,345. This is rather significant when the present high cost of building materials is considered. It will be noted that the increase this year is over 100 per cent. A large part of this is for manufacturing and public buildings.

The Cincinnati Electrical Tool Company, Cincinnati, has acquired a manufacturing building at Flint Street and Freeman Avenue, with 32,000 sq. ft. of floor space and as soon as remodeling work has been completed will remove from its present location on Evans Street. The new building will enable the company to more than double its present output of portable electric drilling and grinding machines.

The Cincinnati Lathe & Tool Company, Oakley-Cincinnati, suffered an estimated fire loss last week of $3,500. The fire was confined to the pattern storage room and will not affect deliveries on orders that the firm now has under way. William Heindel is president.

The Enterprise Machine Company, Middletown, Ohio, whose incorporation has been noted, will construct a factory building, 90 x 144 ft., of reinforced concrete and steel. The company will manufacture and rebuild machinery, but will make a specialty of paper mill equipment. Practically all the necessary machinery has been purchased.

The Malm Machine Company, Dayton, Ohio, advises that the recent increase in its capital stock to $100,000 is to increase its manufacturing facilities. Its latest product is a rotary punching machine for making rubber soles.

The Dayton Power & Light Company, Dayton, Ohio, is remodeling its power plant on East Fourth Street.

The Hetherington-McCabe Mfg. Company, Piqua, Ohio, has been incorporated with $5,000 capital stock by Wells Hetherington, John McCabe, and others, to manufacture tools. Further details are lacking.

The Model Mfg. Company, Leesville, Ohio, has been incorporated with $10,000 capital stock by J. M. Price and others. It will manufacture incubators and other poultry equipment.

The Star Fire Clay Company, Wellsville, Ohio, has been incorporated with $25,000 capital stock by John M. Smith and others.

The Jeffrey Mfg. Company, Columbus, Ohio, has lately received, directly and indirectly, orders from the Government for industrial appliances, including conveying machinery, hoists, steel implements, etc. The company is operating all departments at full capacity.

The Central South

LOUISVILLE, KY., June 4, 1917.

There appears to be about three customers for every lot of steel machinery that can be delivered at once in this section. One agent told of a car of steel tubing which he offered by letter to three former customers. The first telephoned and got it, the other two telegraphing too late. An order of transformers has just been booked for delivery 16 months hence. Prices on items on track or ready to load are soaring. A number of local factory additions are held up on deliveries. The coal situation shows no improvement and the shortage of cars continues a cause of difficulties.

The Inman Veneer & Panel Company, Louisville, Ky., which is building a factory, has increased its capital to $25,000.

The Sebree Light & Power Company, Sebree, Ky., has been incorporated with a capital stock of $8,100, by Henry Powell, J. J. Korb and D. W. McMullin and is establishing an electric lighting plant.

The Paducah Grain & Elevator Company, Paducah, Ky., is being organized by P. A. Jones, LaCenter, Ky., and others, with a capital stock of $50,000. It will take over an existing building and equip it as an elevator plant.

The Special Ford Starter Company, Paducah, Ky., has been incorporated with a capital stock of $20,000 by Harry Wallace, E. C. Phelps and S. E. Foreman, who propose to establish a factory.

The Hart Mfg. Company, Louisville, Ky., has been incorporated with a capital of $6,000 by T. W. Vinson, H. K. Cole and R. E. Gordon to manufacture heating and ventilating plants, drinking fountains, etc.

The John G. Duncan Company, Knoxville, Tenn., is asking for two 4 x 6-in., double-cylinder, double-drum hoisting engines, complete with winches and boilers, or would prefer engines 6 x 8-in. as above; jobber's prices on an 8 x 10-in., single-drum, double-cylinder, steam hoisting engine, with and without boiler, with drum to carry 600 ft. ¾-in. wire rope; dealer's price on one steam driven air compressor, 120 cu. ft. of air per min., 100 lb. pressure.

The Memphis Broom & Brush Company, Memphis, Tenn., with capital stock of $20,000 has been incorporated by M. C. Hatcher, H. E. Sadler, H. E. Ehrlicher and others.

The Ben Fox Cooperage Company, Nashville, Tenn., is in the market for a 6 to 8-ton chain block, second hand.

Birmingham

BIRMINGHAM, ALA., June 4, 1917.

Machinery houses report business good except in regard to deliveries. Mining development work is active and pumps, engines and boilers are in demand, as well as hydroelectric apparatus.

Talladega, Ala., will build a waterworks plant costing $145,000, with a daily capacity of 1,000,000 gal.

The J. B. McCrary Company, Atlanta, is preparing plans for a waterworks system for Lineville, Ala., to cost $20,000 to $25,000.

The American Machine & Mfg. Company, Atlanta, will erect a foundry and machine shop at a cost of $35,000.

The United States Switch Company, Montgomery, Ala., has been incorporated in Delaware with a capital of $1,750,000 to manufacture steel automatic lock switches. W. L. Shepherd, S. J. Winter, B. L. Gladys, Jr., and J. Lee Holloway, all of Montgomery, are the incorporators.

St. Louis

ST. LOUIS, MO., June 4, 1917.

The General Automatic Scale Company, St. Louis, has been incorporated with a capital stock of $100,000 by Henry C. Schaper, William J. O'Day, Richard Scheid and others to manufacture automatic scales.

The Phillips Motor Car Company, St. Louis, has been incorporated with a capital stock of $20,000 by John H. C. F. and G. A. Phillips to equip a garage and repair plant and to manufacture steam and internal combustion engines.

The Oliver Electric & Mfg. Company, St. Louis, has increased its capital stock from $30,000 to $100,000.

The Inland Machine Works, St. Louis, John Flammang president, has acquired a site and will erect a plant, two stories, 70 x 430 ft., with four wings, 70 x 400 ft.

The Monsanto Chemical Works, St. Louis, is in the market for two 500-hp. water tube boilers with accessory equipment, stokers, etc.

The Butler Mfg. Company, Kansas City, Mo., will equip an addition, 125 x 140 ft., for the manufacture of steel products.

The Joplin Welding Company, Joplin, has been incorporated with a capital stock of $20,000 by Frank Parks, Charles Wyatt, W. N. Andrews and others.

The Missouri Mines Company, Neck City, Mo., will equip a concentrating plant of 1000 tons daily capacity and is in the market for steam shovel equipment.

The Babst Motor Company, Kansas City, Mo., 3309 Troost Avenue, will equip a garage and repair shop at a cost of $50,000.

The Samuel F. Baker Motor Company, Kansas City, Mo., will equip repair plant and garage at a cost of about $25,000. Bids will be opened July 1 for 20-in. drill presses, arbor presses, grinder and buffer and electric motors, compressor, etc.

The Camden Electric Gin Company, Camden, Ark., T. J. Watts and others interested, will install electrically operated equipment of 50 bales capacity every 8 hr.

The Earle Compress Company, Earle, Ark., F. W. Reisinger, 1625 Peabody Avenue, Memphis, Tenn., president, will equip a plant requiring about $35,000 of machinery.

The Jonesboro Compress Company, Jonesboro, Ark., has been incorporated with a capital stock of $50,000 by J. E. Parr, E. C. Stuck and Alex Berger.

The Camden Foundry Company, Camden, Ark., will rebuild the portion of its plant recently destroyed by fire.

The Arkansas Prepay Fan Company, Little Rock, Ark., has been incorporated with a capital stock of $30,000 by E. T. Reeves, Hugh D. Hart and Gus Berther and others and will equip a factory to manufacture electric fans.

Billings, Okla., will receive bids until Aug. 1 for the construction and equipment of an electric light and power plant, a waterworks plant and sewage disposal plant. The Mackintosh-Walton Engineering Company, State National Bank Building, Oklahoma City, Okla., is in charge of the plans.

The Woodward Foundry & Machine Company, Woodward, Okla., has been incorporated with a capital stock of $25,000 by Charles H. Martin, Henry Hageman and William H. Smith.

The Polar Producing & Gasoline Company, Okmulgee,

Okla., has been incorporated with a capital stock of $500,000 by E. W. Kimbley, R. D. Donnelly and C. F. Sibble.

The Jefferson Military College at Natchez, Miss., will equip an isolated electric light and power plant.

The Price Veneer & Lumber Company, Columbia, Miss., F. T. H. Price president, will install equipment with a daily capacity of 25,000 ft. of logs.

Janse Brothers, Boomer, Crane & Howe, Berwick, La., will establish a shipbuilding plant with 12 shipways, involving an investment of about $300,000.

The Union Bridge & Construction Company, Morgan City, La., will equip a shipyard to build wooden ships of 3000 tons capacity.

Texas

AUSTIN, TEX., June 2, 1917.

The machine tool trade continues most satisfactory. The demand for irrigation pumping machinery, including engine equipment, is unusually large and is regarded as an indication of the extensive plans that are being made for increasing agricultural production.

The Freeport Chemical Company, Freeport, a subsidiary of the Stauffer Chemical Company, San Francisco, Cal., will build two more units to its plant at a cost of about $300,000. It manufactures sulphuric acid and other chemical products.

The City Council of Albuquerque, N. M., has purchased the local waterworks plant from the Albuquerque Water Company for about $400,000. Additional machinery will be installed.

Horton & Horton, Houston, will build a shipyard on the ship channel near that city. They announce that keels will be laid for five wooden vessels at once. Each ship will cost about $400,000.

The Midland Bridge Company, Houston, has acquired a site on the ship channel for a shipyard. It will build six wooden vessels, each to cost about $400,000.

The Carter Lumber & Building Company, Houston, will construct a shipyard on the ship channel to build wooden ships.

J. J. Settegast, Jr., and associates, plan to build a shipyard at Houston. Mr. Settegast is president of the Houston Car Wheel Works.

The Acme Buckle Company, Weatherford, will install machinery for the manufacture of buckles. The plant will cost $10,000. R. A. Eddleman of La Junta, Col., is a stockholder.

The Alice Electric & Ice Company will install a new engine and make other improvements to its plant at Alice.

The Republic Box Company, Inc., Houston, which has just increased its capital stock from $25,000 to $50,000, will install additional box-making machinery and enlarge its plant.

Millar A. Smith of New York City, and associates, are promoting the organization of a company to take over more than 8000 acres of sugar plantations and three sugar mills in the lower Rio Grande valley in the vicinity of San Benito and Brownsville. The syndicate also plans to build several additional sugar mills and a refinery. It is stated the plans call for an investment of about $50,000,000. The holdings of the Borderland Sugar Company, San Benito, are also to be taken over.

California

LOS ANGELES, CAL., May 29, 1917.

The Los Angeles Ship Building Company, Los Angeles, has filed plans for the buildings to comprise its initial shipbuilding works on Smith's Island, Los Angeles Harbor, to cost in the neighborhood of $750,000. The structures will include a one-story machine shop, 100 x 400 ft.; one-story foundry, 100 x 300 ft.; one-story rivet shop and storage, 80 x 300 ft.; one-story boiler shop, 100 x 200 ft.; two-story general construction works, 100 x 600 ft.; carpenter shop, 100 x 300 ft.; one-story pipe shop, 100 x 200 ft.; one-story electric shop, 90 x 150 ft.; and one-story general warehouse, 100 x 350 ft. The works will include four shipbuilding berths, each about 60 x 500 ft., and wharf of same size. An aerial tramway and electric traveling cranes will be installed. Fred L. Baker, president of the Baker Iron Works, 950 North Broadway, is president and treasurer. S. L. Napthaly, vice-president and general manager, will be in charge of construction, assisted by George E. Greenwood, superintendent of construction. F. A. Gardner is chief engineer.

The L. & B. Truck Mfg. Company, Los Angeles, has been incorporated with a capital of $35,000 to manufacture motor truck attachments and transmission apparatus. The company is now building a new plant at Fifty-fourth Street and Boyle Avenue. H. L. and William P. Bidelman, C. R. Crump and C. B. McCall, are the incorporators.

The Cambria Spring Company, 913 Santee Street, Los Angeles, manufacturer of automobile springs and wheels, has commenced the enlargement of its spring department to provide increased capacity. Two furnaces to handle vanadium steel spring work will be installed, as well as other equipment. R. W. Sheldon is vice-president.

The Superbo Mfg. Company, Los Angeles, has been incorporated with a capital of $75,000 to manufacture water heaters and kindred products. Julius Brombacher, David Brown and G. E. Delavan, Jr., are the incorporators.

John F. Craig, Long Beach, Cal., and associates, have incorporated the Craig Shipbuilding Company, Long Beach, with a capital of $500,000. The company has commenced the erection of initial buildings for its proposed plant on waterfront property at Water Street and Harbor Channel No. 3, with frontage of about 1000 ft. Other incorporators are James G. Craig, Thomas R. Merrell and Charles H. Cummins, Jr., all of Long Beach.

The Keystone Iron & Steel Works, Los Angeles, has been incorporated with a capital of $500,000 to manufacture iron and steel products. The company is said to be affiliated with the Keystone Iron Works, 973 North Main Street, specializing in the manufacture of iron lamp standards, fire hydrants, pumps, etc., and will take over and operate the plant with increased facilities. J. E. Geyer, A. A. Barton, W. F. Allen, W. S. McGiffert and J. P. Loftus, all of Los Angeles, are the incorporators.

The proposed shipbuilding plant to be constructed by George W. Bush and Henry M. Coit, San Diego, Cal., will cost about $50,000 for initial structures. The City Council has granted permission for the establishment of the plant at the foot of Beardsley Street, with site fronting on San Diego Bay. It will make a specialty of boat and ship repairs.

The plant of the Tracy Brick & Art Stone Company, near San Diego, Cal., and adjoining site will be taken over by the Tracy Engineering & Shipbuilding Company, recently organized with a capital of $250,000, and used for the manufacture of large vessels. The present plant is to be enlarged and capacity increased. Ship berths will be constructed and equipment installed for handling large work. Theron H. Tracy, 1621 Grand Avenue, Los Angeles, is president; H. M. Barstow is secretary and treasurer.

The Pacific Northwest

PORTLAND, ORE., May 29, 1917.

The organization of new shipbuilding corporations continues steadily; and, though many of the new propositions are not yet in the market for equipment, the demand for wood-working machinery continues ahead of the supply. General machine shop equipment is also keeping in active demand. The failure of Western railroads to secure rolling stock in the East has led to preparations for wooden car building on a large scale at coast shops. A number of hydro-electric plants are announced, though the big issue of Government bonds has tended to discourage the financing of a large amount of municipal work. The call for lumber and logging machinery is very active.

Lumbermen are urging the Government to make the same specifications for spruce for airplane building as were made by the Allies. It is asserted that the present specifications make it impossible for the Northwest mills, which control the greater part of the available spruce timber, to fill the Government orders, and naturally the timber will go to the Allies.

Indications are that the crops for 1917 will break all records. The demand for farm equipment, both new and second-hand, has never been equalled in the Northwest.

The Motorship Construction Company, Vancouver, Wash., has been organized by Merrill A. Reed, J. W. Knibbs and J. W. Dougherty. A site has been secured with 300 ft. of frontage, and three ways will be constructed at once.

The Alaska Dry Dock & Mfg. Company, Juneau, Alaska, has been incorporated by Carl Dahl, B. L. Coleman and V. A. Paine. A frontage of 700 ft. has been secured, and a ship building and repairing plant, a marine railway, capable of cradling vessels up to 100 tons capacity, and a machine shop will be built. Boats ranging from 5 to 100 tons capacity will be built.

The Tacoma Shipbuilding Company, Tacoma, will immediately lay keels for six wooden vessels of 3000 tons each.

F. C. Knapp, president of the Peninsula Shipbuilding Company, has organized another company which has secured a site with a frontage of 450 ft. on the Columbia River for a shipbuilding plant.

The American Shipbuilding Company, Warrenton, Ore.,

recently incorporated, has begun work on three marine ways to cost $30,000. Three additional ways are to be built later.

The Peninsula Iron Works, Portland, will build a one-story addition to its foundry, 40 x 100 ft., at a cost of $3,000.

The Snokomish Power Company, Seattle, has been incorporated with a capital stock of $1,000,000 by G. H. Tilden, W. H. Wynn, Jr., and H. W. Bunker.

The Sandstrom Shipbuilding Company, Seattle, has secured contracts for two 3000-ton wooden ships to cost about $600,000. The vessels will be twin screw type, equipped with two 500-hp. heavy oil burning engines. The company is now installing a plant on an 8½-acre site with 1000 ft. of frontage on Puget Sound. Herman H. Sandstrom is general manager.

The H. D. Stewart Shipbuilding Company, Seattle, has been incorporated by H. D. and R. S. Stewart with a capital stock of $100,000. A shipyard to build ships of 2500 tons capacity will be equipped.

The Nilson & Kelez Shipbuilding Company, Seattle, which recently announced plans for a shipbuilding plant, has been incorporated with a capital stock of $200,000 by A. S. Nilson, N. M. Kelez, John Erickson and R. F. Oldham.

The Sloan Shipbuilding Corporation, Seattle, has secured contracts for 12 additional wooden hull ships. The company's plant at Olympia will be enlarged and equipped at a cost of $40,000.

The Seattle Steamship Company, Seattle, has been incorporated with a capital stock of $200,000 by W. C. Dawson, John P. Hausmann, Philip Morrison and others.

The Wikander Rotary Engine Company, Seattle, has been incorporated with a capital stock of $150,000 by C. N. Wikander and Joseph Harrington.

Frank Oleson & Sons, Inc., shipbuilders, Seattle, have been incorporated with a capital stock of $100,000 by Frank, Frank Oleson, Jr., and Alfred Oleson. It has leased a site on the Duwamish waterway, and will begin the construction of buildings and the installation of ways at once.

The United States Shipbuilding Company, Seattle, has bought a site at Charleston for the construction of marine ways and a shipbuilding plant.

The Sloan Shipbuilding Company, Olympia, Wash., will place orders within a few weeks for more than $2,000,000 worth of machinery, oil tanks, equipment and ship supplies. Orders for practically all of this material will be placed in Seattle and Northwest cities. The company holds contracts for twenty wooden hull vessels, which will be completely equipped, with the exception of the engines.

The Mogul Logging Company, Silver Beach, Wash., has sold its sawmill, shingle mill and box factory to George W. Smith of Bellingham. The plant will be overhauled, and new equipment installed for a daily capacity of 80,000 shingles.

The American Shipbuilding Company, Warrenton, Ore., has commenced construction work on its initial building, 60 x 180 ft.

Grant Smith & Co., contractors, Seattle and Portland, have recently secured a site on the waterfront at St. Johns, Ore., on which will be erected a shipbuilding plant, equipped with 10 ways.

The North Bend Lumber & Mill Company, North Bend, Ore., plans to expend $120,000 in improvements and extensions.

The Albany Lumber Company, Albany, Ore., will increase the daily capacity of its mill from 30,000 to 50,000 ft. New equipment will be required.

The Sawmill Engineering & Construction Company, Klamath Falls, Ore., plans the construction of a sawmill, to have an annual capacity of 15,000,000 ft. of lumber.

The Sloan Shipbuilding Company, Olympia, Wash., has secured contracts for the construction of 12 ocean-going freighters, making a total of 20 vessels contracted for. Two additional slips will be built at once. Four ships will be full-powered motor ships, and the other 16 will be steam, all of 3000 tons capacity. The Capital City Iron Works, which is owned by the shipbuilding company, will have its machine plant completed by July 15.

The Hesse-Martin Iron Works, Portland, Ore., has increased its capital stock from $5,000 to $135,000.

The Yakima Artificial Ice & Cold Storage Company, North Yakima, Wash., has awarded contract for an addition, to cost $50,000.

The Skinner & Eddy Corporation, Seattle, has received contracts for six 8800-ton steel steamships for the Government Shipping Commission, aggregating about $8,000,000. Two ships will be built at one time.

Canada

TORONTO, ONT., June 4, 1917.

The International Shipbuilding Corporation which is erecting shipyards at Newcastle, N. B., has taken over the plant and business of the Sydney Foundry Company, Sydney, N. S., which it will greatly extend to build steel ships. New machinery for the manufacture of marine engines, winches, etc., has been purchased and will be installed as rapidly as possible. It has also purchased a small floating drydock at Halifax, N. S., which will be towed to Sydney, to be used in the work of ship repairing. Extensive contracts for the construction of marine engines and the repairing of vessels for the Admiralty have been obtained. A graving dock will eventually be built where ocean liners can be repaired.

J. A. Kellough, 240 Balmoral Street, Fort William, Ont., will build a brick creamery to cost $7,500, and is in the market for refrigerator, motor, shafting, pulleys, ice crusher, boiler, etc.

The North American Chemical Company, Goderich, Ont., is having plans prepared for an addition to its plant to cost $25,000. J. F. Button is manager.

The Muskoka Foundry Company has purchased property at Bracebridge, Ont., and will be in the market for machinery, new tools, motive and shafting, etc.

A. C. Hardy, 26 King Street West, Brockville, Ont., is in the market for a water storage tank of 500 gal. capacity, a small pump, gas engine, etc.

The Fruit Machinery Company, Ingersoll, Ont., is in the market for a steam boiler of 100 to 150 hp.

St. Genevieve de Batiscan, Que., will install a pumping plant to cost $9,000, and is asking for prices. Tenerede Trudel is clerk.

The Hamilton & Toronto Sewer Pipe Company, Ltd., Toronto, is in the market for fly-wheel, 14 to 16 ft. in diameter; crown face 20-in. or more, must be split.

The Machinery & Transmission Company, Elmira, Ont., will build an addition to its plant to cost $15,000.

The Canada Steamship Lines, 9 Victoria Square, Montreal, are planning a drydock at Hamilton, Ont., to cost $250,000.

The Representatives, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Frank J. Hughes, 72 Queen Street West; Daniel P. J. Kelly, James O. Trounce and others to manufacture automobiles, trucks, motors, etc.

The Goderich Drydock & Shipbuilding Company, Ltd., Toronto, Ont., has been incorporated with a capital stock of $1,000,000 by David I. Grant, Mervil MacDonald, 72 Alexander Boulevard; Percy E. F. Smily, 16 Temple Avenue, and others, to build ships, drydocks, shipbuilding plants, etc.

The Wheel & Foundry Company, Ltd., Toronto, has been incorporated with a capital stock of $25,000 by Arthur J. Thomson, 132 Balmoral Avenue; William S. Morlock, 107 Roxborough Street West; Reginald H. Parmenter and others, to manufacture engines, machinery, tools, etc.

The Canadian Des Moines Steel Company, Ltd., Chatham, Ont., has been incorporated with a capital stock of $100,000 by Robert L. Brackin, Burton L. Bedford, Elliott M. Reeves and others to manufacture structural steel, machinery, tools, etc.

Edwin S. Wood & Co., Ltd., Montreal, has been incorporated with a capital stock of $40,000 by Louis A. David, Louis P. Crepeau, S. H. R. Bush and others to manufacture railway supplies, tools, electric cars, engines, boilers, motors, etc.

The Shipbuilders Corporation, Ltd., Toronto, has been incorporated with a capital stock of $250,000 by Gerard Ruel, 127 Isabella Street; Reginald H. M. Temple, 275 Russell Hill Road; Robert George O. Thomson and others to build ships, machinery, engines, etc.

The McCord Mfg. Company, Inc., incorporated in the State of New York with a capital stock of $50,000, has been granted permission to manufacture electrical goods, machinery, tools, engines, motors, automobile supplies, etc., in Ontario. Alexander R. Bartlett, Windsor, Ont., is attorney for the company.

The Republic Stamping & Enameling Company, Ltd., incorporated in the State of Ohio with a capital stock of $40,000, has been granted permission to do business in Ontario. Charles H. Ivey, London, Ont., is attorney for the company.

The plant of the Winnipeg Foundry Company, 115 Robinson Street, Winnipeg, destroyed by fire May 18, will be rebuilt and equipment purchased.

The Waterloo Boy Kerosene Tractor of Canada, Winnipeg, has been incorporated with a capital stock of $20,000 by W. F. Rondabush, C. A. Sargent, E. P. Hayden and others to manufacture tractors, farm implements, tools, etc.

Government Proposals

WASHINGTON, D. C., June 5, 1917.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until June 12, schedule 1187, for two 30-in. band saw machines for Philadelphia; two vertical wood-post boring machines for Philadelphia and Norfolk; two single horizontal punch machines for Philadelphia and Norfolk; one portable punching machine for Norfolk; four 25 and 30-ton portable hydraulic punching machines, five 50, 70 and 30-ton pneumatic riveting machines, and two vertical spindle rotary scarfing machines for Philadelphia and Norfolk; one electrically driven gate shear for Norfolk; schedule 1188, two motor driven, 2¼ x 24-in. flat turret lathes for Philadelphia and one semi-universal radial drill for Philadelphia: schedule 1192, opening date unassigned, one 4-motor, 15-ton electric traveling overhead crane for Washington; schedule 1196, seven universal high-speed engine lathes for Annapolis; schedule 1197, one adjustable rail 4-head milling machine for Washington; schedule 1198, one steam turbine-driven electric generator for Annapolis; schedule 1199, one 16-in. motor-driven high-speed sensitive drill, one screw-cutting, extension motor-driven back-geared lathe, and one universal milling machine, all for Brooklyn; schedule 1200, 800 tons open-hearth pig iron for Washington; schedule 1185 for June 12, two single-acting circulating air pumps for Philadelphia.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, May 26, for supplies for the naval service as follows:

Schedule 1189, ordnance—Class 1, Washington, motor-driven boring and turning lathe—bid 1, $162,000; Class 2, Washington, two shrinkage turning lathes—bid 1, $250,000.

Schedule 1083, opened May 29, steam engineering—Class 11, Mare Island, radial drill—Bid 70, $4,623 and $4,541; 98, $4,255; 150, $4,860; alternate bids, f.o.b. works, 70, $4,263 and $4,178; 98, $3,965; 150, $4,860.

Schedule 1137, ordnance, Washington—Planer equipment—Bid 28, $1,974; 98, $2,685.

Schedule 1138, construction and repair—Class 161, Brooklyn, steam hammer—Bid 15, $3,748; 93, $3,680; 98, $4,220 and $2,966; 106, $6,047; 166, $4,560.

Schedule 1183, construction and repair—Class 251, Portsmouth, Boston, Brooklyn, Philadelphia, Norfolk, Charleston, Puget Sound, Mare Island, pneumatic drills, wood borers and grinders—Bid 25, $268,560; 74, $308,556.91; 75, $330,019.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 1, Niles-Bement-Pond Company; 15, Buffalo Foundry & Machine Company; 25, Chicago Pneumatic Tool Company; 28, Carroll Electric Company; 70, Harron, Rickard & McCone; 74, Ingersoll-Rand Company; 75, Independent Pneumatic Tool Company; 93, Manning, Maxwell & Moore; 98, Niles-Bement-Pond Company; 106, Henry Prentiss & Co.; 150, Fred Ward & Son; 166, Erie Foundry Company.

NEW TRADE PUBLICATIONS

Mechanical Counters.—C. J. Root Company, Bristol, Conn. Booklet entitled "Chidsey's Challenge." Sets forth in a striking manner the important part played by mechanical counters in the daily routine of the average business man from the time he gets up in the morning until he retires at night. The material is arranged in the form of a letter and serves to point out the great variety of uses to which automatic counters are applied.

Screw Machine Products.—Cincinnati Screw Company, Cincinnati. Catalog. Size, 6 x 9 in.; pages, 42. Deals with an extensive line of screw machine products, including automobile parts and other specialties. Tables showing the sizes of screws, nuts and bolts made are included, together with a brief description of the company's plant.

Wood Block Floors.—Ayer & Lord Tie Company, Inc., Railway Exchange Building, Chicago. Booklet. Contains interesting data and photographs of the use of wood block floors in various industrial establishments. After a brief historical introduction and some reference to the use of wood block paving, the advantages of wood block floors in industrial plants, such as resistance to wear and fire, absence of noise, ease of cleaning, absorption of vibration and facilities for making repairs are briefly touched on. This is followed by a description of the manufacture of the blocks. The photographs of plants in which the blocks have been installed are reproduced on inserts of approximately half the size of the booklet and located one between each pair of pages.

Metal Working Machinery and Punches and Dies.—Cleveland Punch & Shear Works Company, Cleveland. Calendar. Size, 7 x 10¼ in. Contains on each leaf the dates for one business week commencing April 2, 1917, and ending Sept. 29, 1917. The dates, while small, are printed in easily read figures on a contrasting background. The larger portion of each leaf is given over to illustrations of various types of punches and dies that are made, and in the upper portion is a panel containing an engraving of some metal working machine, these being different for each leaf. The machines illustrated include punching machines of various types, a wall radial drilling machine, etc. On the back of each leaf is given a list of the standard punches and dies carried in stock with data on the various dimensions and blanks for ordering standard and special tools, diagrams for the insertion of dimensions of the latter being included.

Elevator Machines.—Warner Elevator Mfg. Company, Cincinnati. Pamphlet. Describes and illustrates an electric elevator machine in which the control is claimed to contain only half as many contacts as the ordinary type and in which delicate pilot contacts have been eliminated. The advantages of the use of but four wires to give full control of the car, low starting current and uniformity in starting, stopping and running irrespective of the load on the elevator are briefly touched upon. A graphic ammeter record of the test of an elevator having a capacity of 3000 lb. at a speed of 400 ft. per min. is included.

Centrifugal Pumps.—Allis-Chalmers Mfg. Company, Milwaukee. Bulletin No. 1632A and leaflet. The first illustrates a complete line of centrifugal pumps of all types as well as the pumping units of which they form a part. The engravings of the various styles of pumps are supplemented by descriptions of their construction and specification and dimension tables. A number of test curves are reproduced and instructions for installing and operating the pumps are included. The leaflet pertains to a test of a 10-in. single-stage centrifugal pump which gave a maximum efficiency of 85 per cent. A description of the way the test was made is presented, together with the characteristic curves obtained as a result.

Drop Forgings and Wrenches.—Page-Storms Drop Forge Company, Chicopee, Mass. Catalog. Size, 5 x 7¾ in.; pages, 80. Calls attention to an extensive line of drop forged wrenches of the various standard patterns which can be furnished either milled or unmilled; milled and case hardened with the heads ground or milled, polished, case hardened and lacquered all over with the heads ground bright. A single page is given to each type of wrench with an illustration and table of the sizes that can be supplied. Mention is made of a line of plain and shoulder weldless eye bolts, drop forged thumb screws and nuts and gas engine crankshafts and crank handles that can be furnished. Engravings and size tables of these are presented also. A list of the special drop forgings which can be supplied in steel, Tobin bronze, copper and aluminum is included, together with several group illustrations.

Lathe Tool Holders.—Gisholt Machine Company, Madison, Wis. Circular. Refers to a line of tool holders for use in engine lathes equipped with toolposts of the turret or double-strap type and turret lathes. Illustrations of the tools which are made for back facing, grooving, cutting off, threading, boring and turning; for turning and facing and for boring, turning and facing, are presented, with views of some of the tools used. Diagrams of the holders in place on engine and turret lathes are given, and emphasis is laid upon the fact that the employment of the tool holders enables small pieces of tool steel to be used up to the last inch.

Blow-Off Valves.—Homestead Valve Mfg. Company, Homestead, Pa. Folder. Illustrations and descriptive matter explain the operation and use of a blow-off valve in connection with a quarter-turn plug cock for eliminating the losses due to leaking blow-off valves. A table showing the losses due to leakage through orifices ranging from 1/32 to ½ in. in diameter and with pressures of from 40 to 200 lb. is presented. A number of illustrations of various types of quarter-turn plug cocks are included.

Electric Motors and Generators.—Crocker-Wheeler Company, Ampere, N. J. Two bulletins. The first, No. 177, superseding No. 128, gives a description with illustrations of a line of rolling mill motors which are built in sizes ranging from 6½ to 200 hp. for use on 220 or 230 volt direct-current circuits. The shocks and jars which these motors must withstand in service on cranes, roll trains, transfer and lifting tables and auxiliary work of all kinds about a steel mill,

are briefly stated, with a mention of the provision which has been made in the design to take care of them. The other bulletin, No. 178, superseding No. 144, relates to a three-wire distribution system of direct-current electrical energy. The various methods used are briefly touched upon, followed by a description of a generating unit in which the neutral voltage is actually generated.

Oxy-Acetylene Welding and Cutting.—General Welding & Equipment Company, 107 Massachusetts Avenue, Boston. Two pamphlets. The first covers a line of equipment for welding and cutting metals of all kinds with the oxy-acetylene torch. The different standard types of apparatus are illustrated and briefly described, together with the regulators and torches employed. The other pamphlet is concerned with the cutting of iron or steel by this process and contains data on the cost of removing risers from steel castings in foundries and the cutting up of boilers, structural shapes and shafting in scrap yards.

Wagon and Truck Loaders.—Link-Belt Company, Thirty-ninth Street and Stewart Avenue, Chicago. Book No. 270. Describes a line of wagon and truck loaders for handling coal, coke, stone, sand, fertilizer and similar loose materials from storage. Illustrations and specification tables of standard types are presented, together with views of some of the special machines built to meet individual requirements. A number of illustrations of the loaders in service are included, together with a partial list of users.

Belt Hooks.—Sawyer Belt Hook Company, Pawtucket. Price list No. 8. Presents illustrations of an extensive line of belt hooks for leather, rubber and cotton belts of various thicknesses, with tables of the sizes of each that can be supplied. Directions for applying the hooks are given in a number of cases, and mention is made of other products of the company, which include axe and hammer wedges and a button type of belt fastener.

Mechanics' Tools.—Goodell-Pratt Company, Greenfield, Mass. Tool book No. 13. Size, 3¾ x 5⅝ in.; pages, 432. Treats of a line of mechanics' tools numbering over 1500. The tools covered include a great variety of hand drills, bench and foot power drilling machines, scroll chucks, screw drivers, hacksaw frames and blades, grinding and polishing machines, lathe attachments and tools, levels, squares, punches, calipers, rules, etc. Illustrations and in some cases brief descriptions of the various tools are presented and tables of the different sizes of each that can be supplied are included.

Turbo Blowers and Steam Turbines.—Rateau Battu Smoot Company, 140 Cedar Street, New York City. Catalog A. Deals with the use of the steam turbine as a drive for blowers and high-speed electric generators. The development of the turbine drive for this class of apparatus is briefly reviewed and is followed by a description of the turbine with numerous illustrations of the various parts. A number of views of installations of the turbines, blowers and generators are presented, one combination being a 6000-hp. turbine connected to a blower and a 4000-kw. 60-cycle generator. Ordinarily the turbine drives the blower through a direct connection, but when it is disconnected the generator operates as a motor to drive the blower.

Acid Resisting Pipe and Fittings.—Duriron Castings Company, Dayton, Ohio. Folder No. 100. Presents illustrations and brief descriptions of a line of standard and drainage pipe, fittings, valves, cocks, etc., made from Duriron which is claimed to be acid, alkali and rust proof. A number of dimension tables are included in connection with the illustrations and descriptive matter.

Industrial Buildings.—Westinghouse, Church, Kerr & Co., Inc., 37 Wall Street, New York. Circular. Shows in two composite pictures the great variety of industrial buildings that were designed and built by this company in 1916. The cost of this work amounted to $60,000,000. Included among the structures are a 26,000-hp. oil burning boiler plant, an eight-story reinforced concrete industrial building, an ore dock, a locomotive erecting shop, a complete cartridge plant and an electric railroad. Some figures on the amount of material required to build this city are presented.

Gear Cutting.—Fellows Gear Shaper Company, Springfield, Vt. Fifth edition of a booklet entitled "Commercial Gear Cutting." Contains a brief outline of the three methods of producing gears by milling cutters, generating hobs and a generating gear or cutter with particular reference to the last method. A description of a gear shaping machine cutter, the way in which it works and how it is generated is presented, followed by descriptions of the various machines upon which it is used. A number of examples of work produced on the gear shaping machine are included.

Riveting Machines.—John F. Allen Company, 372 Gerard Avenue, New York. Catalog. Contains illustrations, brief descriptions and specification tables of a line of portable pnuematic, compression and hammer riveting machines for structural, bridge, railroad, boiler, tank and stack work. Each of the machines is given a pair of pages, the illustration being presented on one with the descriptive and tabular matter on the other. Illustrated list of repair parts of the various machines are included.

Vises and Anvils.—Columbian Hardware Company, Cleveland. Catalog. Describes and illustrates a line of vises for various purposes, including blacksmiths', coachmakers', machinists', patternmakers', pipe and vise types. For the most part each particular kind of vise has a single page devoted to it with a condensed table of specifications supplementing the illustration and description. Among the features upon which special emphasis is laid are the use of a special type of bench plate on the blacksmiths' vise and the hollow malleable iron jaws of the machinists' vises. Mention is made of a line of blacksmiths' anvils that can be supplied.

Sheet Metal Working Machinery.—D. H. Stoll Company, Military Road and Lansing Street, Buffalo. Catalog No. 17. Illustrates a complete line of sheet metal working machinery which includes presses of the inclinable, horning and wiring, punching and riveting, gap, arch, double crank and toggle types, as well as power shearing machines, beading and flanging and seaming machines, etc. Brief descriptions and condensed specification tables supplement the illustrations.

Grey-Iron Castings and Grinding and Polishing Machines.—Lamb Knitting Machine Company, Chicopee Falls, Mass. Pamphlet. Pertains to the progress made by the company in the half century since its establishment in March, 1867. While the principal product of the company is a line of knitting machines, a number of which are illustrated, mention is made of other products which include grey-iron castings and a ball-bearing grinding, polishing and buffing machine. A number of illustrations of various departments of the plant are included.

Gas Producers.—Smith Gas Engineering Company, Lexington, Ohio. Catalog No. 10. Embodies a concise description of equipment for delivering cold clean gas from bituminous coal and the advantages, uses and some results obtained from its operation, with illustrations of actual installations. Nothing regarding the chemistry involved in the process of making producer gas is included, it being assumed that this is unnecessary. The operation of the equipment is gone into at some length and typical gas analyses are included for various grades of coal and the gas produced from them, as well as analyses for 12-hr. operation. A partial list of the uses to which gas producer plants are adapted is presented and brief mention is made of other types of plants for producing gas from anthracite coal, coke, charcoal and lignite for power and fuel purposes.

Ball Bearings.—Hyatt Roller Bearing Company, Newark, N. J. Engineering Bulletin No. 408. Calls attention to the application of roller bearings to drilling machines, and points out the advantages, such as reduced friction, saving in power consumption, long life, good lubrication and simplification of design. Diagrams showing the application of the bearings to this class of machinery are presented and tables of the various bearings that can be supplied are included. A number of views of vertical drilling machines of different types equipped with the bearings are presented.

Electrical Machinery.—Wagner Electric Mfg. Company, St. Louis. Calendar hanger measuring 13½ x 23¼ in. The hanger has a birdseye view of the company's plant at the top with the familiar Wagner boy holding a block representing the company's original plant, which was built in 1889, thus visualizing the growth that has taken place. The dates for the past, present and succeeding months are given on three pads and run from May 1, 1917, to June 30, 1918. Complete calendars for 1917, 1918 and 1919 are given on the hanger under the pads.

Centrifugal Pumps.—De Laval Steam Turbine Company, Trenton. Booklet entitled "Progress in Water Works Pumps." Size, 6 x 9 in.; pages, 48. Discusses the general economic and engineering conditions affecting the design and installation of steam turbine driven centrifugal pumps as a substitute for the triple-expansion pumping engines formerly used. Installations in 15 of the principal cities of the United States and Canada are described, including 34 units having an aggregate daily capacity of 999,000,000 gal. Numerous illustrations of the pumps and reproductions of test curves supplement the descriptive matter.

Elevator Controllers.—Cutler-Hammer Mfg. Company, Milwaukee. Booklet E. Refers to a general line of control equipment for electric elevators, including hand rope, car switch and push button control of all classes of freight and passenger service. Illustrations of the various types of apparatus serve to supplement the text description. Mention is made of accessories, such as door safety switches, phase failure and reversal relays, limit and slack cable switches, brakes, etc.

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